

ORIGINAL



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Pine Water Company

BEFORE THE ARIZONA CORPORATION COMMISSION

PINE WATER COMPANY, an Arizona
corporation,

Complainant,

v.

STRAWBERRY HOLLOW
DEVELOPMENT, INC., an Arizona
corporation, STRAWBERRY HOLLOW
PROPERTIES, L.L.C., an Arizona limited
liability company, STRAWBERRY
HOLLOW PROPERTY OWNER'S
ASSOCIATION, INC., an Arizona non-
profit corporation,

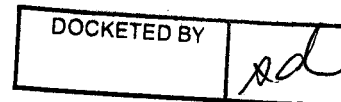
Respondents.

Docket No. W-03152A-01-0464

COMPLAINANT'S REPLY TO
RESPONDENTS' COUNTERCLAIM

Arizona Corporation Commission
DOCKETED

JUL 06 2001



Pine Water Company ("Pine Water") replies to Respondents' counterclaim for deletion from Pine Water's certificate of convenience and necessity ("CC&N") as set forth in paragraphs 46 through 52 of Respondents' Answer and Counterclaim ("the Counterclaim").

REPLY

1. Paragraph 46 of the Counterclaim incorporates by reference each of the preceding paragraphs in Respondents' pleading. Pine Water is not required to reply to Respondents' admissions, denials, affirmative defenses or other responses to the allegations made in its Complaint.

1 2. Answering paragraph 47 of the Counterclaim, Pine Water admits the contents of
2 this paragraph, subject to the accuracy of the legal description contained therein.

3 3. Answering paragraph 48 of the Counterclaim, Pine Water admits the contents of
4 this paragraph.

5 4. Answering paragraph 49 of the Counterclaim, Pine Water admits that it is
6 precluded from providing water service to Strawberry Hollow Phase I as a result of various
7 moratoria enacted by the Arizona Corporation Commission ("Commission"). Pine Water denies
8 that the "waiting period" for new water service from Pine Water is twenty years and affirmatively
9 avers that some individuals have been on the waiting list since May 21, 1997.

10 5. Answering paragraph 50 of the Counterclaim, Pine Water admits that it holds an
11 allocation for 161 acre-feet annually of Central Arizona Project ("CAP") water and has contracted
12 with the Secretary of the Interior for the same. Pine Water specifically denies that it has failed to
13 take "reasonable steps" to utilize or exchange its CAP allocation or to develop other sources of
14 water. Pine Water affirmatively avers that it has been exploring the possibility of a water
15 exchange involving the use of its CAP allocation since mid-1997 and believes that a CAP water
16 exchange is a viable alternative to consider and that such consideration must include a careful
17 economic and regulatory analysis of implementation costs, environmental effects, impacts on
18 downstream water rights holders, and a quantification of reliable alternative surface water flows.

19 Pine Water further avers that it has augmented its supplies and increased its operational
20 flexibility through, among other things, the development of "Project Magnolia," a 10,300 foot
21 long 8-inch water pipeline connecting the water systems of Pine Water and Strawberry Water
22 Company. This project took nearly three years to develop and cost nearly \$450,000. The project
23 can deliver more than 700,000 gallons of water daily. Project Magnolia includes automated
24 control systems that allow immediate detection of decreasing water storage levels in either Pine
25 or Strawberry so that the quantity and direction of water can be quickly adjusted to meet demand.
26 As a direct result, Pine Water's CC&N has experienced Stage 1 water conservation levels (i.e., no

1 water use restrictions) throughout 2001. In contrast, Pine experienced 243 total days of water
2 conservation restrictions with 145 consecutive days of Stage 5 water conservation levels, the most
3 severe conservation level requiring a 50% reduction in all indoor water and prohibiting all
4 outdoor watering except for permitted livestock beginning on May 24, 2000.

5 Pine Water further avers that it has trucked in more than 9,100,000 gallons of water to its
6 customers, has drilled five new wells in the Pine area and six new wells in the Strawberry area
7 since 1996, has recaptured significant amounts of water by repairing leaking infrastructure and
8 enhanced its water storage capacity.

9 6. Answering paragraph 51 of the Counterclaim, Pine Water admits that Well
10 Registration No. 55-579973 has been drilled. Upon information and belief, Pine Water denies
11 that that well is "capable of producing water to satisfy the anticipated demand of property owners
12 within Strawberry Hollow Phase I." Pine Water affirmatively avers that Strawberry Hollow
13 Phase I is located in an area that has historically experienced extreme water shortages and
14 continues to experience the same. See Reports of the Arizona Water Commission and the
15 Arizona Department of Water Resources attached at Tabs A1 through A3; Report prepared for
16 E&R Water Company, Inc., at Tab A4. Pine Water further alleges that the Commission has
17 recognized that there is a lack of available water supplies within the Pine Water certificated area
18 and has instituted various moratoria on that basis. See Commission Decisions (Nos. 56539,
19 56654, and 59753) attached at Tabs B1 through B3.

20 7. Answering paragraph 52 of the Counterclaim, Pine Water incorporates by
21 reference its replies to paragraphs 46-51 of the Counterclaim as set forth in paragraphs 1 through
22 6 above. Pine Water further denies that Strawberry Hollow Phase I should be deleted from Pine
23 Waters' CC&N. Pine Water lacks information sufficient to form a belief as to whether the
24 Commission's failure to do so would result in a hardship to existing and future property owners at
25 Strawberry Hollow Phase I.

26 8. The remainder of Respondents' counterclaim constitutes their Prayer for Relief, to

1 which Pine Water is not required to respond.

2 9. Pine Water affirmatively alleges that, but for the existence of the moratoria
3 resulting from an extreme water shortage in the area, it is fit, willing and able to serve Strawberry
4 Hollow Phase I on terms consistent with Arizona law, including the rules and regulations of the
5 Commission.

6 10. Pine Water affirmatively alleges that deletion of Strawberry Hollow Phase I from
7 Pine Water's CC&N would be contrary to the public interest, which is the controlling factor in the
8 Commission's decisions in this docket. Specifically, deletion would be contrary to the public
9 interest because it would allow Respondents to circumvent the Commission's moratoria.

10 **AFFIRMATIVE DEFENSES**

11 11. Respondents are estopped from seeking deletion from Pine Water's CC&N.

12 12. Respondents' counterclaim is barred by laches.

13 13. Respondents assumed the risk that actions by the State of Arizona could impact the
14 use of their property.

15 14. Pine Water reserves the right to assert other affirmative defenses as they become
16 known through the course of discovery in this docket.

17 **PINE WATER'S PRAYER FOR RELIEF**

18 Respondents' counterclaim is inconsistent with its assertion that it is not acting as a public
19 service corporation. If Respondents are not a public service corporation, they are not subject to
20 regulation by the Commission and do not need to seek deletion from Pine Water's CC&N. If
21 Respondents are adjudicated a public service corporation, then deletion is inappropriate because
22 the Respondent, as a public service corporation seeking to provide water utility service in the area
23 subject to the Commission's moratoria, would be, by its own allegations against Pine Water,
24 unfit, unable and/or unwilling to provide water utility service. Accordingly, Respondents'
25 counterclaim should be denied.

26 ...

1 DATED this 6 day of July, 2001.

2 FENNEMORE CRAIG

3
4 By 

Jay L. Shapiro
Thomas R. Wilmoth
Attorneys for Complainant
Pine Water Company

5
6
7 Original and 10 copies
8 hand-delivered this 6
9 day of July, 2001 to:

10 Docket Control
11 Arizona Corporation Commission
12 1200 W. Washington St.
13 Phoenix, AZ 85007

14 Copy of the foregoing
15 hand-delivered this 6
16 day of July, 2001 to:

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22 Phoenix, AZ 85007

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**Basic Data for Selected
Wells and Springs in the
Pine-Payson-Kohl's Ranch Area
Gila County, Arizona**

REPORT NO. 9

ARIZONA WATER COMMISSION

AUGUST 1977

17C
WCB

PW 0001-000167

***Basic Data for Selected
Wells and Springs in the
Pine-Payson-Kohl's Ranch Area
Gila County, Arizona***

Prepared in cooperation with
the U.S. Geological Survey



Arizona Water Commission • Report No. 9
Phoenix, Arizona
August 1977

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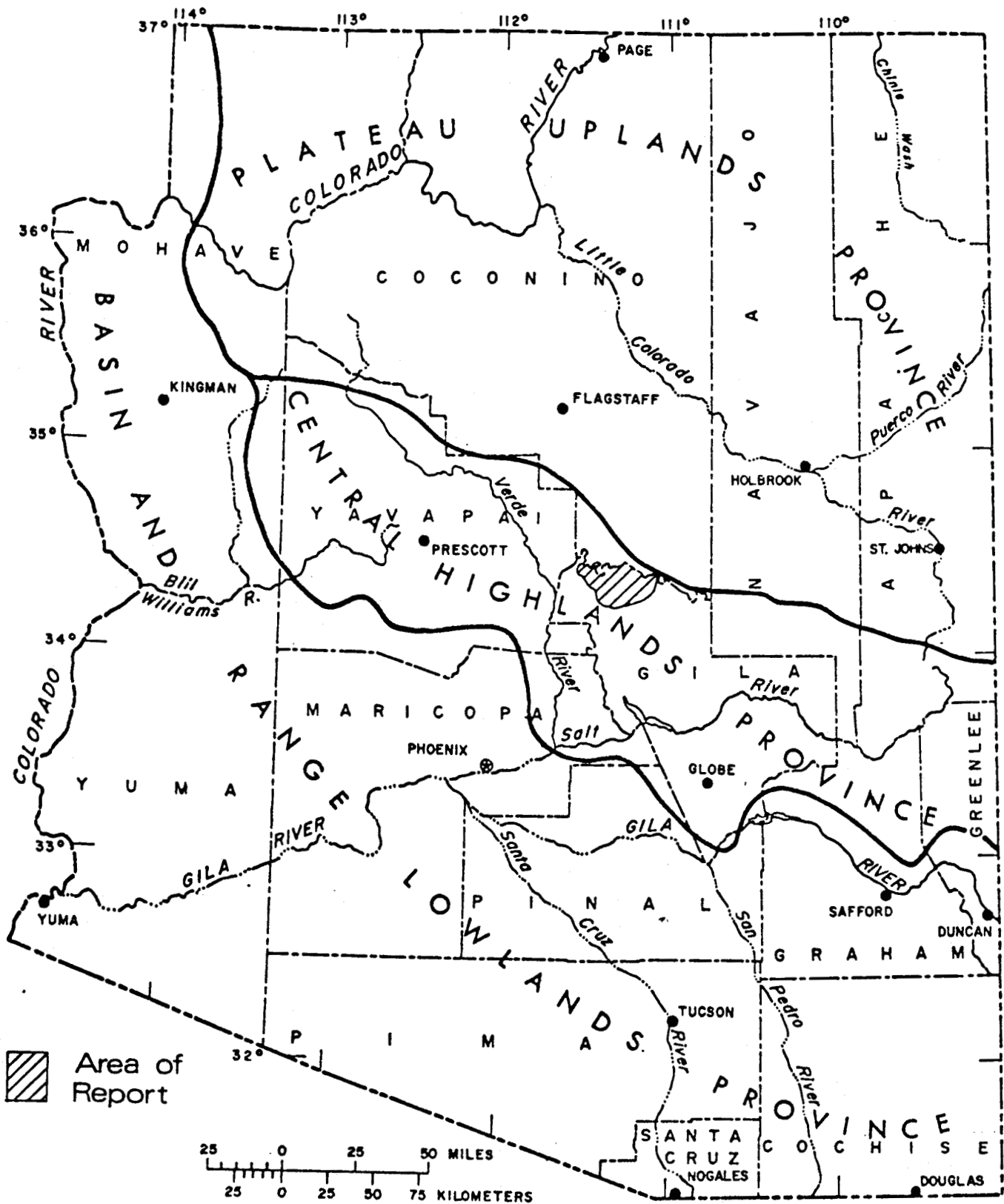
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INTRODUCTION

The increasing population and consequent increasing demand for water in the vicinity of Payson has created a need for an appraisal of the ground-water resources of the area. The Arizona Water Commission, in cooperation with the U.S. Geological Survey, is conducting a study of the Pine-Payson-Kohl's Ranch area (fig. 1) to obtain geologic and hydrologic data that will assist in understanding and evaluating its ground-water resources.

This report presents basic data collected and compiled by the U.S. Geological Survey on selected water wells, springs, and water quality of the Pine-Payson-Kohl's Ranch area. At the completion of the study a report will be prepared by the Arizona Water Commission presenting findings on the geologic framework of the area, additional hydrologic information, and a discussion of what is known about the ground-water resources. This report on selected basic data will serve as a supplement to the final report, and is being published at this time to provide the information to the public in a timely manner.



PW 0001-000171

Figure 1.—Area of Report and Arizona's Water Provinces

EXPLANATION OF WELL AND SPRING INFORMATION FOR ARIZONA

Local Number

The local number or well/spring number is the location of a well or spring to the nearest 10 acres in an abbreviated form. The well and spring numbers used by the U.S. Geological Survey in Arizona are in accordance with the U.S. Bureau of Land Management's system of land subdivision. The land survey in Arizona is based on the Gila and Salt River meridian and base line, which divide the state into four quadrants. These quadrants are designated counterclockwise by the letters A, B, C, and D. All land north and east of the point of origin is in A quadrant, that north and west in the B quadrant, that south and west in the C quadrant, and that south and east in D quadrant. The first digit of a well number indicates the township, the second the range, and the third the section in which the well is situated. The letters A, B, C, and D after the section number indicate the well location within the section. The first letter denotes a particular 160-acre tract, the second the 40-acre tract, and the third the 10-acre tract. These letters also are assigned in a counterclockwise direction, beginning in the northeast quarter. If the location is known within the 10-acre tract, three letters are shown in the well number. For example, the number C-04-02 19CAA designates the well or spring as being in the NE1/4NE1/4SW1/4 Sec. 19, T. 4 S.,

R. 2 W. Where more than one well or spring is within a 10-acre tract, consecutive numbers beginning with 1 are added as suffixes.

Oversize sections occur in a few areas in the state. Where a section is more than a mile in any dimension, the excess area is considered a part of that section and has the same section number. The oversized section is divided so that a square-mile unit is adjacent to a normal section within the same township; the rest of the section is considered a separate unit in which appropriate N, S, E, or W letters are assigned, depending on whether the excess land is north, south, east, or west of the square-mile unit. For example, the number C-14-25E12DDD designates the well or spring as being in the SE1/4SE1/4SE1/4 of the eastern unit of Sec. 12, T. 14 S., R. 25 W. Half townships and ranges occur in a few areas of the state and are designated by the letter H following the township or range; for example, C-05-12H09CBA or C-09H02 10DDD.

Use of Water

A	Air Conditioning	N	Industrial, includes
B	Bottling		Mining
C	Commercial	P	Public Safety
D	Dewatering	R	Recreation
E	Power Generation	S	Stock Supply
F	Fire Protection	T	Institutional
H	Domestic	U	Unused
I	Irrigation	Y	Desalination
M	Medicinal	Z	Other

Finish

C	Porous Concrete
F	Gravel Pack with Perforations
G	Gravel Pack with Screen
H	Horizontal Gallery
O	Open End
P	Perforated or Slotted
S	Screen
T	Sand Point
W	Walled
X	Open Hole
Z	Other

Water Level

The letters in place of, or after, the water level indicate the method of water-level measurement or the status of the site at the time of measurement; if no letter appears, the measured water level represents the true static level at the site in feet below land surface.

A	Airline Measurement
C	Calibrated Airline Measurement
D	Dry
E	Estimated
F	Flowing, but head could not be measured
G	Pressure-Gage Measurement
H	Calibrated Pressure-Gage Measurement
L	Interpreted from Geophysical Logs
M	Manometer Measurement
R	Reported, method not known
S	Steel-Tape Measurement
T	Electric-Tape Measurement
V	Calibrated Electric-Tape Measurement
Z	Other

Discharge

The letter following the discharge indicates the method of discharge measurement.

B Bailer
C Current Meter
E Estimated
F Flume
M Totaling Meter
O Orifice
P Pitot-Tube Meter
(Includes Cox Meter)
R Reported, method not known
T Trajectory Method
U Venturi Meter
V Volumetric Measurement
W Weir
Z Other

Method Constructed

A Air-Rotary
B Bored or Augered
C Cable-Tool
D Dug
H Hydraulic Rotary
J Jetted
P Air Percussion
R Reverse Rotary
T Trenching
V Driven
W Drive and Wash
Z Other

Type of Log Available

A Drilling Time Log
 B Casing-Collar Log
 C Caliper (Diameter) Survey Log
 D Driller's Log
 E Electric Log
 F Fluid-Conductivity or Fluid-Resistivity Logs
 G Geologist's Log or Sample Log
 H Magnetic Log
 I Induction Log
 J Gamma Ray Log
 K Dipmeter or Directional (Inclinometer) Survey Logs
 L Laterlog
 M Microlog
 N Neutron Log
 O Microlaterlog
 P Photographic Log (TV, Still, Movie)
 Q Radioactive-Tracer Log
 S Sonic Log
 T Temperature Log
 U Gamma-Gamma Log
 V Fluid-Velocity Log
 Z Other

Type of Spring

A Artesian	P Perched
C Contact	S Seepage or Filtration
F Fracture	T Tubular-Cave
G Geyser	Z Other

Permanence

I Intermittent
 P Perennial
 S Seasonal
 Z Other

Improvements

B Boxed Basin	N None
C Concrete Basin	P Pond
G Gallery	R Pipe
H Spring House	T Trough
L Lined	Z Other

Table 1. - Records of selected wells in the Pine-Payson-Kohl's Ranch area

LOCAL NUMBER	DATE COMPLETED	USE OF WATER	CASING DIA. - ETER (INCHES)	FINISH	DEPTH OF WELL (FEET)	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED
A-09-10 05AAA	1963	S	--	--	--	4200	--	--	--	--
A-09-10 05UD	1963	S	--	--	--	3550	--	--	--	--
A-09-10 13CDA	1963	U	--	--	--	3200	--	--	--	--
A-09-10 1ADUA	1963	H	--	--	--	3190	19.00 S	04/ /1972	--	--
A-09-10 208A 1	1960	H	6	--	--	3155	60.00 Y	--	--	--
A-09-10 208A 2	1971	H	6	--	--	3155	60.00 R	--	--	--
A-09-10 208A 01	1972	H	8	--	--	3155	--	--	--	--
A-09-10 208A 02	1972	H	--	--	--	3155	50.00 S	04/ /1972	--	--
A-09-10 208B	1971	H	6	--	--	3140	22.00 S	04/ /1972	--	--
A-09-10 32ARB	1971	S	--	--	--	3048	--	--	--	--
A-10-10 02BCC	1970	H	5	P	218	5020	34.00 K	1970	23 R	1970
A-10-10 03AAA	04/05/1971	P	5	X	160	5060	76.00 K	04/05/1971	28 H	04/05/1971
A-10-10 03AAB1	04/06/1975	H	5	X	160	5040	68.00 R	04/06/1975	--	--
A-10-10 03AA92	04/06/1975	H	--	X	--	5040	--	--	--	--
A-10-10 03AAC	1801	P	5	--	--	5030	54.40 T	07/02/1975	--	--
A-10-10 03AAD	1801	P	8	--	--	5040	--	--	--	--
A-10-10 03ABA	03/23/1975	P	5	X	200	5040	38.00 R	03/23/1975	--	--
A-10-10 03ARB	02/23/1974	P	5	X	190	5010	101.00 K	02/23/1974	22 R	02/24/1974
A-10-10 03ADA	05/21/1971	P	6	X	140	5050	64.00 R	05/21/1971	26 R	05/21/1971
A-10-10 03CBC	1975	H	5	X	140	4950	49.30 S	07/02/1975	--	--
A-10-10 03CCC	07/01/1975	H	8	0	95	4920	30.00 R	07/01/1975	--	--
A-10-10 03CDB	1958	P	8	--	400	4940	37.00 R	1974	200 E	07/15/1975
A-10-10 03DAA1	1958	H	--	--	--	5020	34.30 S	07/02/1975	--	--
A-10-10 03DAA2	1958	H	--	--	--	5010	--	--	--	--
A-10-10 03DAC1	1974	U	8	--	93	4980	77.60 S	10/11/1975	--	--
A-10-10 03DAC2	1974	P	8	--	300	4980	75.90 S	10/11/1974	--	--
A-10-10 03DAD	11/18/1973	H	5	X	150	5002	64.00 R	11/18/1973	--	--
A-10-10 03DBA	11/18/1973	H	--	X	--	4980	--	--	--	--
A-10-10 03DBU	06/15/1972	H	4	P	260	4970	51.00 K	06/15/1972	--	--
A-10-10 04ABA	06/15/1972	U	--	P	--	4940	33.00 V	07/02/1975	--	--
A-10-10 04CCC	06/15/1972	H	--	P	--	4870	--	--	--	--
A-10-10 04DEA	06/15/1972	H	--	P	--	4960	--	--	--	--
A-10-10 05CCA	1975	P	--	0	--	4820	28.00 V	07/03/1975	--	--
A-10-10 05CCB	1975	U	--	0	--	4800	--	--	--	--
A-10-10 05DCL	1975	--	--	0	--	5850	--	--	25	--
A-10-10 05DCU	1975	I	--	U	--	4840	--	--	--	--
A-10-10 06DCA1	1975	Z	--	0	--	4760	12.00 T	07/02/1975	--	--
A-10-10 06DCA2	03/12/1976	U	5	X	115	4760	--	--	--	--
A-10-10 06AEA	03/12/1976	H	--	X	--	4850	--	--	--	--
A-10-10 06AHL	1954	--	8	--	110	4820	27.00	04/12/1963	50	1963

Table 1. - Records of selected wells in the Pine-Payson-Kohl's Ranch area --- continued

DRAW- DOWN (FEET)	DEPTH TO FIRST OPENING (FEET)	METHOD CONSTRUCTED	TYPES OF LOGS AVAILABLE	PRINCIPAL AQUIFER	TEMPERATURE (DEGREES C)	SPECIFIC CONDUCTANCE (UHMS/CM AT 25 C)	LOCAL NUMBER
--	--	--	--	--	--	--	A-09-10 05AAA
--	--	--	--	--	--	--	A-09-10 06DD
--	--	--	--	--	--	--	A-09-10 1RCD
--	--	--	--	--	--	--	A-09-10 180DA
--	--	C	--	--	--	--	A-09-10 20BA 1
--	--	C	--	--	--	--	A-09-10 20BA 2
--	--	--	--	--	--	--	A-09-10 20BAD1
--	--	--	--	--	--	--	A-09-10 20BAD2
--	--	--	--	--	--	--	A-09-10 20BB
--	--	--	--	--	--	--	A-09-10 32ABB
46	--	A	--	--	--	--	A-10-10 02BCC
33	40	A	D	--	--	--	A-10-10 03AAA
--	40	A	D	--	--	--	A-10-10 03AAR1
--	--	A	--	--	--	--	A-10-10 03AAB2
--	--	--	--	--	--	--	A-10-10 03AAC
--	--	--	--	--	--	--	A-10-10 03AAD
--	68	A	D	--	--	--	A-10-10 03ABA
74	40	A	D	--	--	--	A-10-10 03ABB
32	40	A	D	--	--	--	A-10-10 03ADA
--	40	A	--	--	--	--	A-10-10 03CBC
--	--	C	D	--	--	--	A-10-10 03CCC
--	180	--	--	--	--	--	A-10-10 03CDB
--	--	--	--	--	--	--	A-10-10 03DAA1
--	--	--	--	--	--	--	A-10-10 03DAA2
--	--	--	--	--	--	--	A-10-10 03DAC1
--	200	--	--	--	--	--	A-10-10 03DAC2
--	60	A	D	--	--	--	A-10-10 03DAD
--	--	A	--	--	--	--	A-10-10 03DBA
--	140	A	D	--	--	--	A-10-10 03DBD
--	--	A	--	--	--	--	A-10-10 04ABA
--	--	A	--	--	--	--	A-10-10 04CCC
--	--	A	--	--	--	--	A-10-10 04DBA
--	--	A	--	--	--	--	A-10-10 05CCA
--	--	A	--	--	--	--	A-10-10 05CCR
--	--	A	--	--	--	--	A-10-10 05DBC1
--	--	A	--	--	--	--	A-10-10 05DCD
--	--	A	--	--	--	--	A-10-10 06UCA1
--	40	A	D	--	--	--	A-10-10 06UCA2
--	--	A	--	--	--	--	A-10-10 08ABA
--	--	A	--	--	--	--	A-10-10 08ABD

Table 1. - Records of selected wells in the Pine-Payson-Kohl's Ranch area -- continued

10

LOCAL NUMBER	DATE COMPLETED	USE OF WATER	CASING DIAMETER (INCHES)	FINISH	DEPTH OF WELL (FEET)	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED
A-10-10 08BA6	1959	--	--	--	108	4840	--	--	--	--
A-10-10 09AAA	1959	H	--	--	--	4930	--	--	--	--
A-10-10 09ABA	02/28/1974	H	5	X	132	4900	28.00	H 02/27/1974	--	--
A-10-10 09ADB	12/08/1973	H	6	X	100	4970	23.40	S 07/16/1975	--	--
A-10-10 09BAB	1959	H	--	--	114	4880	10.00	R 09/10/1959	--	--
A-10-10 10AAC	08/24/1974	H	6	X	300	4960	--	--	--	--
A-10-10 10AAD	06/22/1971	H	5	X	200	4950	115.00	R 06/22/1971	--	--
A-10-10 10ABA	09/23/1974	P	6	X	400	4950	63.70	S 07/03/1975	--	--
A-10-10 10BAC	08/16/1974	H	5	X	150	4950	55.00	R 08/16/1974	--	--
A-10-10 10BCB	05/13/1971	H	5	X	100	4950	52.00	R 05/13/1971	--	--
A-10-10 10BDB	1952	P	8	X	108	4980	65.00	R 07/ /1974	--	--
A-10-10 22RDD	03/06/1974	H	5	X	84	4830	61.00	R 03/06/1974	--	--
A-10-10 22CAA	03/04/1975	--	5	X	--	4840	--	--	--	--
A-10-10 22CAB	10/02/1973	H	5	X	102	4870	42.00	R 10/02/1972	--	--
A-10-10 22CAC	09/25/1973	H	5	X	97	4870	51.00	R 09/25/1973	--	--
A-10-10 22CBD	08/13/1974	H	6	--	200	4885	--	--	--	--
A-10-10 22DBA	09/11/1973	H	5	X	76	4820	40.00	R 09/11/1973	--	--
A-10-10 22DBD	09/14/1973	--	5	X	98	4840	41.00	R 09/14/1973	--	--
A-10-10 22DCA	11/15/1973	H	5	X	173	4840	54.00	R 11/15/1973	--	--
A-10-11 05BAA	11/16/1973	H	--	X	--	4580	--	--	--	--
A-10-11 05BAD	1975	H	6	--	85	4600	7.80	S 07/17/1975	--	--
A-10-11 05DAC	1975	H	--	--	--	4550	4.00	S 07/17/1975	--	--
A-11-10 11AAA1	1975	P	--	--	--	4920	212.60	S 08/05/1975	--	--
A-11-10 11AAA2	1975	--	--	--	--	4890	--	--	--	--
A-11-10 11BAA	1975	P	--	--	--	4890	--	--	--	--
A-11-10 14DAC	1956	U	8	X	120	4530	59.50	S 10/17/1974	--	--
A-11-10 130BC	1956	P	--	X	--	4490	35.50	S 10/ /1974	--	--
A-11-10 23AA01	1960	P	10	X	350	5180	236.00	T 07/01/1975	--	--
A-11-10 23AA02	1960	P	10	X	350	5180	160.00	R 04/18/1963	--	--
A-11-10 23ACA	06/30/1973	P	5	X	220	5150	124.00	R 06/30/1973	--	--
A-11-10 27CCB	1959	P	8	0	400	5000	197.00	T 07/02/1975	--	--
A-11-10 27DCB1	09/18/1971	H	5	X	200	5040	124.00	R 09/18/1971	--	--
A-11-10 27DCB2	05/10/1972	H	5	X	156	5040	130.00	R 05/10/1972	--	--
A-11-10 27DDB	1975	P	8	--	400	5052	121.00	T 07/01/1975	--	--
A-11-10 230BD	01/19/1974	H	5	0	300	5040	190.00	V 07/02/1975	--	--
A-11-10 310AC	1975	P	8	--	330	5060	170.20	T 07/01/1975	--	--
A-11-10 34ABA	03/31/1971	P	10	X	600	5070	235.00	R 03/31/1971	--	--
A-11-10 34CCD	09/ /1971	P	--	X	350	5000	129.00	T 07/02/1975	--	--
A-11-10 34CDD	09/ /1971	P	5	P	263	5010	67.00	R 09/ /1971	--	--
A-11-10 34DCA	09/ /1971	P	5	P	203	5060	104.00	R 09/ /1971	--	--

Table 1. - Records of selected wells in the Pine-Payson-Kohl's Ranch area -- continued

URAN- DOWN (FEET)	DEPTH TO FIRST OPENING (FEET)	METHOD CONST- RUCTED	TYPES OF LOGS AVAILABLE	PRINCIPAL AQUIFER	TEMPERATURE (DEGREES C)	SPECIFIC CONDUCTANCE (UHMS/CM AT 25 C)	LOCAL NUMBER
--	--	A	--	--	--	--	A-10-10 08BAB
--	--	A	--	--	--	--	A-10-10 09AAA
--	42	A	D	--	--	--	A-10-10 09ABA
--	43	A	D	--	--	--	A-10-10 09ADB
--	--	--	--	--	--	--	A-10-10 09BAB
--	40	A	D	--	--	--	A-10-10 10AAC
--	40	A	D	--	--	--	A-10-10 10AAD
--	43	A	D	--	--	--	A-10-10 10ABA
--	68	A	D	--	--	--	A-10-10 10BAC
--	64	A	D	--	--	--	A-10-10 10BCB
--	--	A	--	--	--	--	A-10-10 10BDB
--	39	A	D	--	--	--	A-10-10 22BDD
--	35	A	D	--	--	--	A-10-10 22CAA
--	40	A	D	--	--	--	A-10-10 22CAB
--	44	A	D	--	--	--	A-10-10 22CAC
--	--	A	D	--	--	--	A-10-10 22CBD
--	42	A	D	--	--	--	A-10-10 22DBA
--	51	A	D	--	--	--	A-10-10 22DBD
--	41	A	D	--	--	--	A-10-10 22DCA
--	--	A	--	--	--	--	A-10-11 05BAA
--	45	--	--	--	--	--	A-10-11 05BAD
--	--	--	--	--	--	--	A-10-11 05DAC
--	--	A	--	--	--	--	A-11-10 11AAA1
--	--	A	--	--	--	--	A-11-10 11AAA2
--	--	--	--	--	--	--	A-11-10 11BAA
--	40	A	--	--	--	--	A-11-10 18DAC
--	--	A	--	--	--	--	A-11-10 18DBC
--	20	--	--	--	--	--	A-11-10 23AAD1
--	19	A	--	--	--	--	A-11-10 23AAD2
--	80	A	D	--	--	--	A-11-10 23ACA
--	100	A	--	--	--	--	A-11-10 27CCB
--	36	A	D	--	--	--	A-11-10 27DCB1
--	42	A	D	--	--	--	A-11-10 27DCB2
--	100	--	--	--	--	--	A-11-10 27DOB
--	40	A	D	--	--	--	A-11-10 28DBD
--	100	--	--	--	--	--	A-11-10 31DAC
--	250	C	D	--	--	--	A-11-10 34ABA
--	0	A	D	--	--	--	A-11-10 34CCD
--	170	A	D	--	--	--	A-11-10 34CDD
--	103	A	D	--	--	--	A-11-10 34DCA

Table 1. - Records of selected wells in the Pine-Payson-Kohl's Ranch area -- continued

LOCAL NUMBER	DATE COMPLETED	USE OF WATER	CASING DIAMETER (INCHES)	DEPTH OF WELL (FEET)	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED
A-11-10 34DCC	09/01/1971	P	6	347	5020	78.00	V 07/08/1975	--	--
A-11-10 34DUC	09/01/1971	P	5	350	5040	115.00	R 09/01/1971	--	--
A-11-10 35AAA	01/07/1964	H	6	93	4750	20.30	S 07/14/1975	--	--
A-11-10 35ADC	02/11/1974	H	5	100	4750	31.00	R 02/11/1974	32 H	04/11/1974
A-11-10 36ADD1	02/26/1974	H	5	100	4720	21.00	R 02/26/1975	--	--
A-11-10 36ADD2	09/09/1974	H	5	100	4720	34.00	R 09/09/1974	--	--
A-11-10 36ADD3	09/15/1974	H	5	120	4750	36.00	R 09/15/1974	--	--
A-11-10 36ADD4	1975	H	5	120	4725	15.00	T 08/25/1975	25 E	08/25/1975
A-11-10 36ADD5	1975	H	--	145	4720	--	--	--	--
A-11-11 32ADB	1975	H	--	--	5630	--	--	--	--
A-11-11 22CCC	04/02/1969	H	6	245	5080	108.00	R 04/02/1969	22	04/03/1969
A-11-11 27B88	1965	H	6	250	5050	162.00	T 08/21/1975	--	--
A-11-11 27B90	1957	H	6	175	5080	130.70	T 08/22/1975	12 H	--
A-11-11 27B81	1975	H	--	200	5040	140.00	SR 07/16/1975	--	--
A-11-11 27B82	1975	H	--	216	5040	115.00	S 07/16/1975	--	--
A-11-11 27BCC	11/22/1971	H	5	140	4990	61.00	R 11/22/1971	26	11/22/1971
A-11-11 27B8C	1975	H	--	--	4920	81.00	S 07/16/1975	--	--
A-11-11 24ADB1	1949	H	8	150	5000	--	--	20 R	--
A-11-11 24ADB2	1955	H	18	120	5000	58.00	R 1955	20 H	1955
A-11-11 24ADB3	1956	S	--	120	5005	--	--	--	--
A-11-11 28ADD1	06/08/1971	H	5	120	4990	90.20	S 08/22/1975	18	06/08/1971
A-11-11 28ADD2	06/10/1971	H	5	140	4980	52.00	R 06/10/1971	21 R	06/10/1971
A-11-11 28ADB	06/10/1971	P	--	--	4920	--	--	--	--
A-11-11 28DBA	1956	H	--	85	4930	--	--	--	--
A-11-11 31AAD1	1954	H	6	100	4675	40.00	S 09/10/1959	--	--
A-11-11 31AAD2	12/12/1970	H	6	63	4670	47.00	R 12/12/1970	--	--
A-11-11 31AAD3	01/10/1971	H	6	84	4670	44.00	R 01/10/1971	--	--
A-11-11 31ADA	1957	H	6	80	4680	40.00	S 09/10/1959	7 V	--
A-11-11 31ADC1	1975	P	--	--	4650	94.50	S 07/15/1975	--	--
A-11-11 31ADC2	1975	P	--	--	4650	--	--	--	--
A-11-11 31ADC3	1975	H	--	--	4680	33.60	S 07/16/1975	--	--
A-11-11 31ADU	1955	H	--	65	4670	50.00	S 09/08/1959	--	--
A-11-11 31CAA	1975	P	--	240	4680	25.30	S 07/14/1975	--	--
A-11-11 31DBC	1975	H	5	105	4680	20.00	S 07/14/1975	--	--
A-11-11 32B8C1	1956	P	8	90	4670	42.20	S 07/16/1975	--	--
A-11-11 32B8C2	1901	H	--	--	4680	--	--	--	--
A-11-11 32CHB	1953	H	--	78	4670	35.00	S 07/15/1975	--	--
A-11-11 35DEC	12/23/1973	P	5	284	5800	194.00	R 12/23/1973	--	--
A-11-11 35DCD	04/01/1971	P	6	300	5770	181.50	T 08/21/1975	--	--
A-11-11 35AAA	06/01/1957	P	--	223	5750	162.00	08/21/1975	--	--

Table 1. - Records of selected wells in the Pine-Payson-Kohl's Ranch area -- continued

DEPTH TO FIRST OPENING (FEET)	METHOD CONST- RUCTION	TYPES OF LOGS AVAILABLE	PRINCIPAL AQUIFER	TEMPERATURE (DEGREES C)	SPECIFIC CONDUCTANCE (UHMS/CM AT 25 C)	LOCAL NUMBER
--	A	--	--	--	--	A-11-10 34DCC
--	A	D	--	--	--	A-11-10 34DDC
--	A	--	--	--	--	A-11-10 36AAA
46	A	D	--	--	--	A-11-10 36ADC
--	A	D	--	--	--	A-11-10 36ADD1
--	A	D	--	--	--	A-11-10 36ADD2
--	A	D	--	--	--	A-11-10 36ADD3
43	A	--	--	--	--	A-11-10 36ADD4
--	A	--	--	--	--	A-11-10 36ADD5
--	A	--	--	--	--	A-11-11 02ADB
--	A	D	--	--	--	A-11-11 22CCC
--	--	--	--	--	--	A-11-11 27BBB
--	C	--	--	--	--	A-11-11 27880
--	--	--	--	--	--	A-11-11 278CB1
--	--	--	--	--	--	A-11-11 278CR2
44	A	D	--	--	--	A-11-11 278CC
--	--	--	--	--	--	A-11-11 27CBC
--	C	--	--	16.5	--	A-11-11 28ADB1
--	C	--	--	--	--	A-11-11 28ADB2
--	B	--	--	--	--	A-11-11 28ADB3
35	A	D	--	--	--	A-11-11 28ADD1
44	A	D	--	--	--	A-11-11 28ADD2
--	A	--	--	--	--	A-11-11 280AD
--	C	--	--	--	--	A-11-11 28DBA
--	C	--	--	--	--	A-11-11 31AAD1
--	C	D	--	--	--	A-11-11 31AAD2
--	C	D	--	--	--	A-11-11 31AAD3
--	C	--	--	--	--	A-11-11 31ADA
--	--	--	--	--	--	A-11-11 31ADC1
--	--	--	--	--	--	A-11-11 31ADC2
--	--	--	--	--	--	A-11-11 31ADC3
--	C	--	--	--	--	A-11-11 31ADD
--	--	--	--	--	--	A-11-11 31CAA
--	A	--	--	--	--	A-11-11 31DBC
--	--	--	--	--	--	A-11-11 328BC1
--	--	--	--	--	--	A-11-11 328BC2
--	--	--	--	--	--	A-11-11 32CBR
190	A	D	--	--	--	A-11-11H05DBC
80	A	D	--	--	--	A-11-11H05DCD
--	A	--	--	--	--	A-11-11H06AAA

Table 1. - Records of selected wells in the Pine-Payson-Kohl's Ranch area -- continued

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LOCAL NUMBER	DATE COMPLETED	USE OF WATER	CASING DIAMETER (INCHES)	FINISH	DEPTH OF WELL (FEET)	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED
A-11-11-11-19DAD	06/ /1957	H	--	--	--	5270	10.00	S 07/17/1975	--	--
A-11-11-11-20CBC	06/ /1957	S	--	--	--	5270	--	--	--	--
A-11-11-11-20C80	08/15/1960	U	8	P	70	5250	5.00	R 08/15/1960	60.0	03/10/1962
A-11-12 04CDC	08/15/1960	P	--	P	--	5800	151.00	07/17/1975	--	--
A-11-12 21CAD	08/15/1960	U	--	P	--	5325	--	--	--	--
A-11-12 250BD	01/ /1964	P	4	P	205	5640	35.00	R 1964	3 R	1964
A-11-12 296CB	1957	P	--	P	260	5670	7.00	R 1957	23 V	1957
A-11-12 29DBA	1957	P	8	X	205	5590	6.00	S 1959	23 V	1957
A-11-12 306BA	01/12/1974	P	5	X	260	5740	98.00	X 01/12/1974	--	--
A-11-12 328BA	1969	P	6	P	304	5720	91.50	T 08/21/1975	13 R	1969
A-11-13 190DD	1969	H	--	P	--	5835	--	--	--	--
A-11-13 20C8A	1952	P	--	--	90	5930	33.80	05/14/1952	--	--
A-11-13 29CCB	1952	P	--	--	--	5880	15.00	S 07/17/1975	--	--
A-11-13 29CCD	1952	P	--	--	60	5800	14.96	S 05/14/1952	--	--
A-11-13 30AAB	05/18/1974	P	5	X	200	5820	58.00	R 05/18/1974	--	--
A-11-13 34C8A	02/07/1970	H	8	P	152	6165	18.60	T 08/23/1975	--	--
A-11-13 34CDD	02/07/1970	U	--	P	--	6080	--	--	--	--
A-11-10 20C8B	1975	P	--	--	--	5110	--	--	--	--
A-11-10 24ABB	11/06/1973	H	6.50	O	200	5470	--	--	--	--
A-11-10 24ABD	10/11/1973	H	7	X	100	5320	51.00	10/11/1973	--	--
A-11-10 24ACC1	09/25/1973	H	5.56	P	66	5200	15.00	R 09/25/1973	--	--
A-11-10 24ACC2	10/01/1973	H	5	P	50	5240	12.00	R 10/01/1973	--	--
A-11-10 24BAA	10/17/1973	H	5	X	55	5200	17.00	P 10/17/1973	50	10/17/1973
A-11-10 24BAC1	1801	P	8	X	105	5200	--	--	--	--
A-11-10 24BAC2	11/02/1973	H	7	X	35	5200	12.00	R 11/02/1973	--	--
A-11-10 24BBD	09/27/1973	H	5.50	P	50	5220	10.00	R 09/27/1973	--	--
A-11-10 24BCA	09/21/1973	H	5.50	X	138	5200	12.00	R 09/21/1973	--	--
A-11-10 24BDB	09/04/1974	H	6	X	150	5200	15.00	R 09/04/1974	--	--
A-11-10 24BDC	10/27/1973	H	6.62	X	50	5200	8.00	Z 10/27/1973	--	--
A-11-10 24BDD1	10/27/1973	U	--	X	78	5200	--	--	--	--
A-11-10 24BDD2	10/01/1973	H	5.56	P	50	5200	12.00	R 10/01/1973	--	--
A-11-10 24BDD3	10/28/1973	H	7	X	50	5190	8.00	R 10/28/1973	--	--
A-11-10 24CAA1	10/06/1973	H	6	X	230	5180	58.00	R 10/06/1973	--	--
A-11-10 24CAA2	08/23/1974	H	6	X	50	5180	20.00	R 08/23/1974	--	--
A-11-10 24DBB	09/13/1973	H	6	X	230	5170	51.00	R 09/13/1973	--	--
A-11-10 34DCC	09/13/1973	--	--	X	--	4800	--	--	--	--
A-11-11 34B8B	1975	P	--	--	200	5510	123.40	S 07/17/1975	--	--
A-11-11-11-32ABC	1958	H	--	--	800	5980	700.00	R 1958	--	--
A-11-11-11-32BBA	1959	H	--	--	544	5950	503.00	R --	--	--
A-12-04 20C8C	1801	U	8	--	--	5710	--	--	--	--

Table 1. - Records of selected wells in the Pine-Payson-Kohl's Ranch area -- continued

DRAW- DOWN (FEET)	DEPTH TO FIRST OPENING (FEET)	METHOD CONST- RUCTION	TYPES OF LOGS AVAILABLE	PRINCIPAL AQUIFER	TEMPERATURE (DEGREES C)	SPECIFIC CONDUCTANCE (UHMS/CM AT 25 C)	LOCAL NUMBER
--	--	A	--	--	--	--	A-11-11H19DAD
--	--	A	--	--	--	--	A-11-11H20C8C
--	0	C	D	--	--	--	A-11-11H20C8D
--	--	C	--	--	--	--	A-11-12 04CDC
--	--	C	--	--	--	--	A-11-12 21CAD
--	100	A	D	--	--	--	A-11-12 25D8D
--	--	A	--	--	--	--	A-11-12 29C8C
--	20	--	--	--	--	--	A-11-12 29D8C
--	52	A	D	--	--	--	A-11-12 30E8A
144	--	A	--	--	--	605	A-11-12 32B8A
--	--	A	--	--	--	--	A-11-13 19D0D
--	--	--	--	--	--	--	A-11-13 20C8A
--	--	--	--	--	--	--	A-11-13 20C8C
--	--	--	--	--	--	--	A-11-13 29CCD
--	55	A	D	--	--	--	A-11-13 30AAB
--	142	C	D	--	--	--	A-11-13 34C8A
--	--	C	--	--	8.5	--	A-11-13 34CDD
--	--	--	--	--	--	--	A-11H10 20C8B
--	--	A	D	--	--	--	A-11H10 24A8B
--	10	A	D	--	--	--	A-11H10 24ABD
--	56	A	D	--	--	--	A-11H10 24ACC1
40	40	A	D	--	--	--	A-11H10 24ACC2
45	45	A	D	--	--	--	A-11H10 24BAA
20	20	A	--	--	--	--	A-11H10 24BAC1
18	18	A	D	--	--	--	A-11H10 24BAC2
--	40	A	D	--	--	--	A-11H10 24B8D
28	28	A	D	--	--	--	A-11H10 24B8CA
21	21	A	D	--	--	--	A-11H10 24B8B
49	49	A	D	--	--	--	A-11H10 24B8C
--	--	A	--	--	--	--	A-11H10 24BDD1
--	40	A	D	--	--	--	A-11H10 24BDD2
16	16	A	D	--	--	--	A-11H10 24BDD3
--	--	--	D	--	--	--	A-11H10 24CAA1
10	10	A	D	--	--	--	A-11H10 24CAA2
16	16	A	D	--	--	--	A-11H10 24DBB
--	--	A	--	--	--	--	A-11H10 35DCC
--	--	C	--	--	13.0	--	A-11H11 35B8B
--	--	--	--	--	--	--	A-11H11H32ABC
--	--	--	--	--	--	--	A-11H11H32BBA
--	--	--	--	--	--	--	A-12-08 20CDC

Table 1. - Records of selected wells in the Pine-Payson-Kohl's Ranch area -- continued

LOCAL NUMBER	DATE COMPLETED	USE OF WATER	CASING DIAMETER (INCHES)	DEPTH OF WELL (FEET)	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED
A-12-08 21CCC	1801	H	8	--	5770	69.00	11/07/1974	--	--
A-12-08 21CDC1	1801	H	10	--	5795	57.00	11/07/1974	--	--
A-12-08 21CDC2	1801	P	6	152	5790	50.00	11/08/1974	70	--
A-12-08 21DAB	1968	--	6	--	5920	150.00	10/ /1968	--	--
A-12-08 21DAB1	1968	P	6	250	5930	153.00	11/08/1974	50	--
A-12-08 21DAB2	1801	P	6	228	5880	115.00	11/08/1974	80	--
A-12-08 21DCC	1801	H	8	405	5813	79.00	11/08/1974	25	--
A-12-08 22CAC	1973	P	6	410	5920	258.00	11/08/1974	26	01/28/1974
A-12-08 22CCC	1801	P	8	150	5840	70.00	11/07/1974	65	--
A-12-08 22CCD	1971	H	4	278	5840	60.00	07/07/1971	20	--
A-12-08 22CDA	1954	H	8	140	5900	79.00	11/08/1974	--	--
A-12-08 22CDB	1801	P	8	--	5920	173.00	11/08/1974	--	--
A-12-08 25ADA	1801	U	6	--	5520	231.00	10/17/1974	--	--
A-12-08 25ADC	1971	U	5	177	5523	72.00	10/ /1974	30	--
A-12-08 25CAC1	1971	H	4	208	5520	96.00	05/21/1971	20	--
A-12-08 25CAC2	1801	U	8	--	5525	63.00	11/08/1974	--	--
A-12-08 25CCA	1801	H	8	200	5517	56.00	07/19/1958	--	--
A-12-08 25CDC	1968	H	5	200	5460	104.00	11/07/1974	10	--
A-12-08 25CDD1	1801	U	--	585	5440	--	--	--	--
A-12-08 25CDD2	1801	H	--	240	5400	31.00	11/07/1974	--	--
A-12-08 27HBB	1801	P	6	350	5930	200.00	11/07/1974	40	--
A-12-08 28ABR	1801	H	8	405	5800	138.00	11/08/1974	--	--
A-12-08 29AAA	1801	I	8	--	5740	--	--	--	--
A-12-08 29AAB	1801	H	6	--	5740	100.00	11/07/1974	--	--
A-12-08 29BAB	1801	H	--	--	5710	105.00	11/08/1974	--	--
A-12-08 35DAA	1974	--	16	849	5520	799.00	--	--	--
A-12-08 36AAC	1974	U	--	--	5439	--	--	--	--
A-12-08 36AOD	1801	H	8	910	5420	574.00	11/07/1974	--	--
A-12-08 36BAA	1801	U	5	240	5440	--	--	--	--
A-12-08 36BBA	1801	U	6	180	5520	45.00	10/17/1974	--	--
A-12-08 36BUB	1801	U	8	400	5400	--	--	--	--
A-12-08 36CBB	1801	H	6	734	5435	336.00	11/07/1974	--	--
A-12-08 36DDO	1960	I	8	150	5440	16.00	11/07/1974	15	--
12-09 19CCCC1	1801	P	10	--	5620	79.00	10/17/1974	--	--
12-09 19CCCC2	1801	--	--	--	5570	--	--	--	--
12-09 30BBA1	1969	--	5	60	5550	30.00	11/28/1969	--	--
12-09 30BBA2	1968	--	--	75	5550	40.00	11/30/1968	--	--
12-09 30BBA3	1801	P	8	134	5555	31.00	10/17/1974	--	--
12-09 30BBA4	1973	U	5	90	5550	--	--	--	--
12-09 35CBB	1973	H	--	740	5450	680.00	1971	18	--

Table 1. - Records of selected wells in the Pine-Payson-Kohl's Ranch area -- continued

DEPTH TO DRAW- DOWN (FEET)	DEPTH TO FIRST OPENING (FEET)	METHOD CONST- RUCTED	TYPES OF LOGS AVAILABLE	PRINCIPAL AQUIFER	TEMPERATURE (DEGREES C)	SPECIFIC CONDUCTANCE (UHMS/CM AT 25 C)	LOCAL NUMBER
--	--	--	--	--	--	--	A-12-08 21CCC
--	--	--	--	--	--	--	A-12-08 21CDC1
--	--	H	D	--	--	--	A-12-08 21CDC2
--	60	A	D	--	--	--	A-12-08 21DAR
--	--	--	--	--	--	--	A-12-08 21DAB1
--	--	A	--	--	--	--	A-12-08 21DAB2
--	40	--	--	--	--	--	A-12-08 21UCC
365	120	A	D	--	--	--	A-12-08 22CAC
--	--	--	--	--	--	--	A-12-08 22CCC
100	200	A	D	--	--	--	A-12-08 22CCD
--	--	--	--	--	--	--	A-12-08 22CDA
--	--	--	--	--	--	--	A-12-08 22CDB
--	--	--	--	--	--	--	A-12-08 25ADA
--	90	A	G	--	--	--	A-12-08 25ADC
30	100	A	D	--	--	--	A-12-08 25CAC1
--	--	--	--	--	--	--	A-12-08 25CAC2
--	30	--	--	--	--	--	A-12-08 25CCA
--	--	--	D	--	--	--	A-12-08 25CDC
--	--	--	--	--	--	--	A-12-08 25CDD1
--	--	--	--	--	--	--	A-12-08 25CDD2
--	--	--	--	--	--	--	A-12-08 278BB
--	--	--	--	--	--	--	A-12-08 28AB8
--	--	--	--	--	--	--	A-12-08 29AAA
--	--	--	--	--	--	--	A-12-08 29AAB
--	--	--	--	--	--	--	A-12-08 29BAB
--	--	--	--	--	--	--	A-12-08 35DAA
--	--	--	--	--	--	--	A-12-08 36AAC
--	--	--	--	--	--	--	A-12-08 36ADD
--	--	--	--	--	--	--	A-12-08 36BAA
--	--	--	--	--	--	--	A-12-08 36BBA
--	--	--	--	--	--	--	A-12-08 36BDB
--	--	--	--	--	--	--	A-12-08 36CBB
--	--	--	--	--	--	--	A-12-08 36DDO
--	--	--	--	--	--	--	A-12-09 19CCCL
--	--	--	--	--	--	--	A-12-09 19CCCL2
--	--	H	D	--	--	--	A-12-09 30RBA1
--	--	H	D	--	--	--	A-12-09 30RBA2
--	--	--	--	--	--	--	A-12-09 30RBA3
--	--	--	D	--	--	--	A-12-09 30RBA4
--	40	R	--	--	--	--	A-12-09 36CBB

Table 1. - Records of selected wells in the Pine-Payson-Kohl's Ranch area -- continued

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LOCAL NUMBER	DATE COMPLETED	USE OF WATER	CASING DIAM- ETER (INCHES)	FINISH	DEPTH OF WELL (FEET)	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED
A-12-10 01CAB	01/ /1964	U	--	--	743	7346	731.00	01/04/1964	--	--
A-12-10 23ABC1	1964	P	--	--	--	5750	--	--	--	--
A-12-10 23ABC2	1964	P	--	--	--	5720	--	--	--	--
A-12-10 23CAA	1964	--	--	--	--	5680	--	--	--	--
A-12-10 34DCC	10/15/1973	H	6.62	P	76	5240	12.00	10/15/1973	--	--

Table 1. - Records of selected wells in the Pine-Payson-Kohl's Ranch area -- continued

WELL NO.	DEPTH TO FIRST OPENING (FEET)	METHOD CONST- RUCTED	TYPES OF LOGS AVAILABLE	PRINCIPAL AQUIFER	TEMPERATURE (DEGREES C)	SPECIFIC CONDUCTANCE (UHMS/CM AT 25 C)	LOCAL NUMBER
--	--	--	D	--	--	--	A-12-10 01CAB
--	--	--	--	--	--	--	A-12-10 23ABC1
--	--	--	--	--	--	--	A-12-10 23ABC2
--	--	--	--	--	--	--	A-12-10 23CAA
--	61	A	D	--	--	--	A-12-10 34DCC

Table 2. - Measurements of water levels in two wells
in the Town of Payson

(Water level in feet below land surface;
water level altitude in feet above mean sea level)

Well location	Date measured	Water level	Water- level altitude
(A-10-10)5ccb	10-16-75	19.0	4781
	11- 3-75	19.1	4781
	3- 2-76	18.5	4781
	4- 2-76	18.6	4781
	4-23-76	18.0	4782
	5-19-76	17.6	4782
	6-16-76	18.7	4781
	7-16-76	19.3	4781
	8-17-76	19.1	4781
	9-19-76	19.3	4781
	10-17-76	19.1	4781
	11-11-76	19.1	4781
	12-16-76	19.2	4781
	1-17-77	19.2	4781
(A-11-10)34aba	10-16-75	112.2	4958
	11- 3-75	112.5	4957
	3- 2-76	111.9	4958
	4- 1-76	113.2	4957
	4-23-76	113.3	4957
	5-19-76	113.1	4957
	6-16-76	113.2	4957
	7-16-76	113.5	4956
	8-17-76	113.3	4957
	9-19-76	112.4	4958
	10-17-76	112.1	4958
	11-11-76	111.9	4958
	12-16-76	113.8	4956
	1-17-77	114.2	4956

Table 3. - Records of selected springs in the Pine-Payson-Kohl's Ranch area

LOCAL NUMBER	USE OF WATER	TYPE OF SPRING	PERMANENCE	IMPROVEMENTS	ALTITUDE OF LAND SURFACE (FEET)	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED	PRINCIPAL AQUIFER	TEMPERATURE (DEGREES C)	SPECIFIC CONDUCTANCE (UMHOS/CM AT 25 C)
A-10-10 02DCC	--	--	--	--	4920	5 E F	05/14/1952	--	--	--
A-10-10 33A08	S	--	--	--	4710	--	--	--	--	--
A-10-12 24AAB	P	--	--	--	5000	4 V F	07/16/1975	--	--	350
A-11-10 04CAD	I+S	--	--	--	4640	1300 F F	10/22/1952	--	49.0	--
A-11-10 09AAD	H,I+S	S	P	R	4640	175 C F	05/15/1952	--	14.5	--
A-11-10 048BC	H,I	T	--	--	4640	300 C F	05/15/1952	--	14.5	--
A-11-11 14CUD	S	--	--	--	5840	--	--	--	--	--
A-11-11 36BCC	--	--	--	--	4840	--	--	--	--	--
A-11-12 20DAB	P	--	--	--	5420	--	--	--	--	700
A-11-12 27AAD	S	--	--	--	5350	--	--	--	--	--
A-11-13 07AC	--	--	--	--	6620	70 C F	08/17/1966	--	--	510
A-11-13 09CHB	H	--	--	--	6660	900 E F	08/17/1966	--	49.0	205
A-11-13 18AA	H	--	--	--	6320	15 E F	08/17/1966	--	54.0	--
A-11-09 23ACD	S	--	--	--	6025	3 E F	07/ /1946	--	15.0	--
A-11-09 300CB	S	--	--	--	5190	3 E F	07/ /1946	--	19.0	--
A-11-10 24BCA	S	--	--	--	5215	75 E F	10/18/1952	--	12.0	--
A-11-11 30DCC	I	--	--	--	5190	4200 C F	05/17/1952	--	13.0	--
A-12-08 23CAA	S	--	--	--	6170	1 E F	07/24/1946	--	--	--
A-12-08 26DAB	H,S	C	--	P	5600	1 E F	07/ /1946	--	15.5	--
A-12-08 35CAD	S	C	P	--	5760	0.3 EF	07/18/1946	--	11.0	--
A-12-09 08CCD	S	--	--	--	6020	10 E F	07/23/1946	--	--	--
A-12-09 30DDC1	S	--	--	--	5920	0.3 EF	07/19/1946	--	13.0	--
A-12-09 30DDC2	S	--	--	--	5960	0.3 EF	07/19/1946	--	13.0	--
A-12-09 30DDD1	S	--	--	--	6200	3 E F	07/19/1946	--	13.0	--
A-12-09 30DDD2	S	--	--	--	6200	3 E F	--	--	15.0	--
A-12-10 11CCD	--	--	--	--	6340	--	--	--	--	--
A-12-10 14AAA	--	--	--	--	6210	125 E F	10/18/1952	--	10.5	--
A-12-12 33BAC	H	--	--	--	6480	900 F	10/17/1952	--	9.0	--

LOCAL IDENTIFICATION	DATE OF SAMPLE	TIME	TEMPERATURE (DEG C)	DIS-SOLVED SILICA (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED CALCIUM (CA) (MG/L)	MAGNESIUM (MG/L)	DIS-SOLVED SODIUM (NA) (MG/L)	POSSIBLE SODIUM (K) (MG/L)	OTHERWISE INDICATED (MG/L)
A-10-10 05CC4	75-07-08	1200	--	36	10	31	10	16	--	--
A-10-10 050HC1	59-03-09	--	15.5	34	--	26	10	--	--	--
A-10-10 08ACA	75-07-14	1100	--	28	10	57	25	20	--	--
A-10-10 22080	75-07-03	1015	--	26	10	71	26	34	1.0	--
A-10-11 05HAD	75-07-17	1200	--	31	10	30	9.4	13	.3	--
A-10-12 24AAB	75-07-16	1100	--	13	10	48	12	3.4	.7	--
A-11-10 23ACA	75-07-01	1030	--	27	--	40	19	20	1.5	--
A-11-10 27CC4	75-07-07	1100	--	29	0	24	12	18	.4	--
A-11-11 278CB1	75-07-16	1000	--	24	10	52	21	6.4	.9	--
A-11-11 31ADCI	75-07-15	1130	--	23	10	34	13	14	.5	--
A-11-11 32CB4	75-07-15	1100	--	23	30	65	17	16	.7	--
A-11-11 H05UC4	75-06-27	1300	--	8.6	10	120	24	3.4	.9	--
A-11-11 H08AAA	75-08-28	0900	--	8.1	10	120	16	3.0	.9	--
A-11-12 04CDC	75-07-17	1100	--	11	10	76	25	24	1.5	--
A-11-12 20JAB	75-07-15	1400	--	10	10	95	32	3.8	.8	--
A-11-12 325HA	75-08-27	1200	--	29	10	69	29	16	1.2	--
A-11-15 29CC0	75-06-27	1200	--	7.9	20	110	20	8.0	1.0	--
A-11-13 34CBA	75-08-28	1200	--	9.3	30	130	35	22	2.0	--
A-11-14 22CB0	66-08-09	--	21.8	10	--	14	4.1	--	2.5	--
A-11-10 28BAC1	75-07-17	1130	--	6.3	10	48	15	2.1	.6	--
A-11-11 35CB4	75-07-17	1200	--	8.6	0	63	20	2.2	.9	--
A-12-08 21CCC	74-11-07	1200	10.0	--	--	--	--	--	--	--
A-12-08 210AF1	74-11-07	1300	10.0	--	--	--	--	--	--	--
A-12-08 22CD9	74-10-17	1500	17.0	--	--	--	--	--	--	--
A-12-08 25ADC	74-10-17	1000	24.0	--	--	--	--	--	--	--
A-12-08 25CAC1	74-10-17	0900	16.0	--	--	--	--	--	--	--
A-12-08 25CCA	74-10-17	1300	15.0	--	--	--	--	--	--	--
A-12-08 36AD0	74-11-07	1400	8.0	--	--	--	--	--	--	--
A-12-08 36CB8	74-11-07	1500	10.0	--	--	--	--	--	--	--
A-12-09 19CCC1	74-10-17	0900	19.0	--	--	--	--	--	--	--
A-12-09 306BA1	74-10-13	--	16.0	--	--	--	--	--	--	--

Table 4. - Chemical analyses of water from selected wells in the Pine-Payson-Kohl's Ranch area--continued

DATE OF SAMPLE	EICAR- BONATE (MG/L)	CAR- BONATE (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED NITRATE PLUS NITRATE (N) (MG/L)	DIS- SOLVED ORTHOPHOS- PHORUS (P) (MG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLIDS (SUM OF CONSTITUENTS) (MG/L)	HARD- NESS (CA, MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	PERCENT SODIUM
75-07-08	148	0	10	8.5	1.0	1.9	.00	20	194	120	0	23
58-09-09	--	--	1.9	8.0	1.4	--	--	--	168	106	0	23
75-07-14	196	0	1.7	17	.2	1.0	.02	2	257	250	85	15
75-07-03	349	0	32	17	.3	1.7	.01	100	387	280	0	21
75-07-17	156	0	3.1	5.2	1.3	.02	.01	20	172	110	0	20
75-07-16	207	0	1.7	4.2	.1	.02	.01	0	185	170	0	4
75-07-01	188	0	5.5	35	.2	5.7	.01	0	257	180	24	19
75-07-07	140	0	12	6.8	.6	1.8	.01	0	180	110	0	26
75-07-16	273	0	2.2	7.6	.2	1.1	.01	0	254	220	0	6
75-07-15	194	0	5.4	5.0	.7	.41	.01	0	193	140	0	18
75-07-15	318	0	11	4.2	.3	2.0	.01	0	307	230	0	13
75-08-27	230	--	4.1	3.3	.1	.15	.01	20	279	400	210	2
75-08-26	179	--	3.7	4.4	.1	.98	.01	20	248	370	220	2
75-07-17	155	0	68	5.8	.1	.10	.01	40	308	290	170	15
75-07-15	260	0	1.1	3.4	.1	.20	.01	0	275	370	160	2
75-08-27	262	--	1.3	5.0	.4	.27	.01	30	281	290	77	11
75-08-27	258	--	15	6.5	.2	.11	.02	40	296	360	150	5
75-08-28	192	--	160	16	.1	.02	.01	70	469	470	310	9
66-08-09	66	0	1.0	2.0	.0	--	--	--	66	52	0	--
75-07-17	162	0	6.7	5.9	.1	.12	.00	20	175	180	32	2
75-07-17	329	0	5.5	3.9	.1	.09	.00	20	287	290	20	2
74-11-07	--	--	--	--	--	--	--	--	--	--	--	--
74-11-07	--	--	--	--	--	--	--	--	--	--	--	--
74-10-17	--	--	--	--	--	--	--	--	--	--	--	--
74-10-17	--	--	--	--	--	--	--	--	--	--	--	--
74-11-07	--	--	--	--	--	--	--	--	--	--	--	--
74-11-07	--	--	--	--	--	--	--	--	--	--	--	--
74-10-17	--	--	--	--	--	--	--	--	--	--	--	--
74-10-13	--	--	--	--	.2	--	--	--	--	--	--	--

Table 4. - Chemical analyses of water from selected wells in the Pine-Payson-Kohl's Ranch area--continued

DATE OF SAMPLE	SODIUM AD- SORP- TION RATIO	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH	(UNITS)
75-07-08	.6	310	7.5	
59-09-09	.6	263	6.8	
75-07-14	.6	590	7.9	
75-07-03	.9	660	7.7	
75-07-17	.5	275	7.1	
75-07-16	.1	250	7.5	
75-07-01	.7	700	7.6	
75-07-07	.8	290	7.9	
75-07-16	.2	450	7.9	
75-07-15	.5	330	7.7	
75-07-15	.5	540	7.7	
75-08-27	.1	735	--	
75-08-28	.1	655	--	
75-07-17	.6	660	7.1	
75-07-15	.1	700	7.1	
75-08-27	.4	605	--	
75-08-27	.2	680	--	
75-08-28	.4	950	--	
66-08-09	--	107	7.3	
75-07-17	.1	340	7.8	
75-07-17	.1	550	7.4	
74-11-07	--	515	8.1	
74-11-07	--	520	7.9	
74-10-17	--	500	7.7	
74-10-17	--	555	8.1	
74-10-17	--	700	7.5	
74-10-17	--	775	7.4	
74-11-07	--	335	8.1	
74-11-07	--	365	8.0	
74-10-17	--	540	7.6	
74-10-13	--	470	7.8	

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REPORT
ON
PINE AREA WATER SHORTAGE
July 17, 1989

ARIZONA DEPARTMENT OF WATER RESOURCES

PINE AREA WATER SHORTAGE

EXECUTIVE SUMMARY

Pine is an unincorporated community of 1400 residences located in Northwest Gila County. The community has a history of reoccurring water shortages. In early July, it was reported that numerous residences in Pine were without water. This water shortage became widespread following the 4th of July weekend.

The Department of Water Resources, at the request of the Governor has coordinated the State's effort to evaluate the water shortage problem. The purpose of this report is to identify the magnitude of the water shortage and offer some short term solutions to help resolve the water shortage. This report concentrates on the immediate critical water shortage problems. It is also recognized that water shortages are not uncommon in Pine, and that a long term solution should be examined. However, it is beyond the scope of this report to address the long term issues.

Based on limited data, the following is the current water supply and demand situation:

Supply:

Wells -	43,000 gal/day
Trucks -	40,000 gal/day

Total Supply	83,000 gal/day
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Demand:	120,000 gal/day
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Shortage:	37,000 gal/day
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The source of the trucked water supply is from nearby Strawberry. E & R Water Company expects to curtail this hauling operation soon.

We believe that stringent water conservation measures can eliminate the shortage. To return the system to a safe operation, it is recommended that an additional 500,000 to 1,000,000 gallons be added to the system over the next 15 days. In addition, to ensure the continuous safe operation of the system, it is recommended that a water system analysis be conducted immediately. This will be needed to ensure that the residences have water through the rest of this summer.

In summary, the following is recommended.

- 1) Immediate water conservation. The Arizona Corporation Commission on July 12, 1989, ordered conservation measures and provided authority to the E & R Water Company to disconnect service. Public education is also necessary.
- 2) Continuation of trucking (by E & R Water Company) of 40,000 gal/day from some source other than Strawberry.
- 3) Between 500,000 to 1,000,000 gallons of water be re-supplied to the storage tanks in the system. This will provide storage to help to provide continuous service to weekday users and to insure meeting weekend demands.
- 4) A water system analysis be completed within 30 days.
- 5) Any financial considerations be resolved among the appropriate parties.

I. BACKGROUND

The unincorporated community of Pine, in Northwest Gila County, has a history of reoccurring water shortages. Studies have shown that there is an inadequate water supply source for the Pine area. The major portion of the Pine area is provided water by franchised E & R Water Company. There are approximately 1400 water customers on the Pine system. The water system consists of numerous small capacity wells, small diameter water mains and several ground storage tanks with booster pumps. The water company owner and manager is also owner and operator of another nearby water system.

Early in July, it was reported that numerous customers on the Pine water system were without water. This water shortage continued for several days and became widespread following the 4th of July holidays. The Department of Water Resources, at the request of the Governor's Office, coordinated and was lead agency for an analysis and evaluation of the Pine water shortage problem. Other participating state agencies were: Arizona Corporation Commission, Division of Emergency Services, Department of Transportation and Department of Environmental Quality. Others providing assistance and data included the City of Payson, Gila County and E & R Water Company. Numerous citizens offered comments and opinions.

The daily water demand was estimated from the 1988 monthly water sales records. This demand value is therefore very conservative and does not provide for increased demand on the system; maximum day or various water losses experienced by water systems. The three summer months' water demand, calculated by the Department, is at least 120,000 gallons per day. The production of water is not metered by the water company.

The Department of Water Resources' Hydrology Division performed field measurements on the water company's wells and determined total continuous production did not exceed 43,000 gallons per day and that groundwater levels were low and at some locations below pumping levels. The E & R Water Company has implemented hauling water to the Pine water system from the Strawberry water system which is owned by the E & R Water Company. Currently E & R Water Company is hauling 40,000 gal/day. Total supply is 83,000 gal/day. The Corporation Commission has authorized water use curtailment and issued a moratorium on connecting new services until October 1, 1989. The measures will assist in the prudent use of the available water for personal and hygienic use if maintained and cooperation is received from the water customers.

To not exceed the total supply of 83,000 gal/day, water usage must be held to an average of 60 gallons per home per day, well production must not diminish and E & R Water Company must haul water (or the supply is reduced to 43,000 gal/day). The availability of 60 gal/day allows normal inhouse usage with wise conservation but no outside watering.

If all hauling of water terminates and only the well production is available, water usage will only be available at a rate of 30 gallons per home per day. The use of water without hauling must be limited to the minimum possible needs, estimated at about 5 gallons per capita daily, divided as follows: drinking, 3 pints; cooking 2 quarts; personal cleanliness, 1 gallon; laundry and dishwashing, 2 gallons. Exceeding this usage would deplete the water storage reserve. This low usage rate considers the wells maintaining their present production capacity.

The estimated cost of hauling water from Payson to Pine for 15 days at a rate of 100,000 gallons per day is \$40,000. This estimate includes the cost of the water, equipment and labor.

Hauling cost by E & R from Strawberry is not estimated. The hauling distance is much less than from Payson, therefore, it can be assumed the Strawberry hauling cost would not exceed the Payson cost of \$40.00 per thousand gallons based on one million gallons hauled water.

II. IMMEDIATE TECHNICAL SOLUTIONS

A. WATER CONSERVATION

There is an urgent and immediate need to restrict the use of water to only sanitary and personal uses which occur within the home. The Arizona Corporation Commission, on July 12, 1989 gave water use curtailment authorization to the E & R Water Company, effective until October 1, 1989. The order also suspended the hook-up of any new services. Mr. Ernie Ralls, owner/manager of the E & R Water Company, advised the Department that effective July 13, 1989, the E & R Water Company would place a water use restriction, prohibiting all water uses outside structures. He indicated the water company would enforce the restriction by notifying any observed violators of the restriction and requesting their compliance. Mr. Ralls stated that second offenders would be temporarily disconnected from the water system and reconnected only when they agreed to comply with the outside water use curtailment order and pay a reconnect fee.

The outside water use curtailment order and compliance is expected to reduce daily consumption in the Pine water system from 125,000 to 83,000 gallons per day. The storage tanks are required to contain sufficient volume of water to maintain with, booster pumps, a minimum pressure of 20 psi in the mains and should maintain at all times a quantity of water sufficient for refilling the fire fighting equipment.

Other means of obtaining reduction in water usage includes use of the distribution system by adjusting the booster pumps controls and maintaining lower system pressures necessary only for minimal levels of water service. Valves could be adjusted within the distribution system and at the service lines to reduce flow to a rate corresponding to minimum service resulting in conserving water.

Conservation education meetings must be scheduled for water customers and consumers at which time the importance of water conservation can be explained along with demonstrations of various activities and measures available to conserve water. Several excellent programs on water conservation have been developed and are available for use in the Pine area. The Arizona Corporation Commission has a water conservation program which has been offered to the E & R Water Company.

B. WATER SUPPLY SYSTEM ANALYSIS AND EVALUATION

There is very little reliable information on the water system sufficient to permit an analysis of the source and distribution capability. A system inventory is needed. Manufacturer's data is needed on all pumps and their controllers. Field test data needs to be assembled and a system analysis and evaluation accomplished. Deficiencies should be identified and described and improvements may need to be provided to meet the minimum requirements of the State and acceptable engineering practice.

Following the system evaluation, there should be an analysis of the system operation and maintenance procedures which is necessary to provide a continuous and dependable supply of safe water to all users. The management of the E & R Water Company should provide the necessary resources for these maintenance and operation functions. Up-to-date records are essential for good maintenance and operation practices. Each operating unit should have established a maintenance manual and records of past performance.

C. WATER STORAGE RESUPPLY

The 1988 June-July-August average daily water usage was 120,000 gallons. Measured continuous well production was determined to be approximately 43,000 gallons daily. The wells are not metered and the lowering water levels have caused some wells to be removed from service because of lack of water. The

following calculations are estimates only but reflect the best judgment of the water company owner and Department staff. (See Appendix A).

June-July-August	120,000 gal/day
Weekend (Sat-Sun)	360,000 gal/day
Usage after curtailment	83,000 gal/day
Wells Production*	43,000 gal/day
Amount Needed	77,000 gal/day

* ADWR measurement

It is estimated that to restore minimal water service for a fifteen-day period only, there is a need to transport water from Payson to Pine. Each day, 40,000 gallons would be needed to sustain water service under curtailed conditions, and 60,000 gallons could be hauled and placed in storage for the anticipated heavy weekend demand. Storage would accumulate to a total of 600,000 gallons while at the same time the minimum health and personal daily water usage needs will be met.

The availability of 83,000 gallons of water per day for the 1,369 water customers would allow each metered customer the use of an average of 60 gallons per day. This assumes the distribution system will deliver the water equitably, that water use curtailment will be observed and that the 30 gpm of well production will be continuous and transportation of the 100,000 gallons per day of water from Payson will continue for fifteen days.

During this fifteen day period production from the functioning wells will be monitored and the available water source will be re-evaluated for productivity. If there is no increase in production, water usage would then have to decrease to an average of 30 gallons per connection per day. Assuming three persons per connection this is about five gallons per person per day.

III. WATER SHORTAGE REPORT

A. AREA DESCRIPTION

1. LOCATION

The E & R Water Company Pine Water Service Area is located in T.12 N., R.8 E. and R.9 E., with a small portion of the service area located in T.11½N., Gila and Salt River Base and Meridian. The area is bounded by the Tonto National Forest and located in Gila County. Pine is on State Highway 87 about 19 miles northwest of Payson.

2. ENVIRONMENTAL SETTING

Pine Creek originates at the Mogollon Rim where groundwater surfaces as springs. This flowing stream becomes a "losing" stream around section 19 where the E & R Water Company's franchise area commences. The "lost" surface water recharges an aquifer which consists of Mudstone/Shale/Limestone deposits restricted laterally by the Coconino Sandstone formation. The groundwater travels through this aquifer a great distance before it enters the Redwall limestone formation. This Redwall formation acts as a drain bringing groundwater to very deep levels.

Similar geohydrologic conditions exist at Strawberry Hollow, although more accentuated. The extent of the Mudstone/Shale/Limestone aquifer is more limited and the groundwater reaches the Redwall limestone formation which acts as a drain more rapidly.

The Pine area is rapidly reaching its limit in the amount of water which can be developed as a dependable water supply. The available water can be evaluated for maximum beneficial use. Any plan to develop alternate sources of water should include detailed hydrologic and engineering studies together with estimates of construction and annual operating costs.

B. DESCRIPTION OF THE PROBLEM

In early July, 1989, the Pine water system of the E & R Water Company became unable to meet the continuous water needs of its customers. The Department was requested on July 11, 1989, to be the lead State agency in investigating and evaluating the cause of the problem. A recommendation for immediate action necessary to restore water service to minimal level is to be prepared by the Department in cooperation and with assistance from other State agencies.

In order to gather needed information and data related to the cause of the water shortage, a meeting was scheduled and held in the Payson Council Chambers on July 13, 1989. Because of the widespread interest in the solutions to the water shortage, this meeting was attended by a number of Pine area property owners. Various causes for the water shortage were offered by the property owners.

The loss of pressure in the water system is cause for concern. Back-siphonage and other methods of contamination can occur. It is especially important to maintain system pressure because of the use of septic tanks and disposal fields in the area for the treatment of wastewater. A chlorine residual should be maintained in the water at the furthest point distant from the water treatment plant.

Residents should keep available at least 1 quart of drinking water for each person in a house. Conditions may also warrant storing additional water for cooking, washing and sanitary use. All water faucets should be turned off when water service is interrupted. This is necessary to permit restoration of pressure when water is again available. Without water, the water heater storage tank should be turned off, otherwise, an explosion may occur. Water from non-approved sources should not be consumed. To do so could endanger a person's health.

C. E & R WATER COMPANY SYSTEM

The Pine water system consists of small diameter water distribution mains, wells, ground storage facilities with booster pumps and a treatment facility for a small amount of surface water. The system meters water used by customers. There are no fire hydrants on the system, however; fire fighting tank-trucks can obtain water at the ground storage facilities. Water production is not metered.

The following is a summary of the Pine water system:

Meter connections	1,369
Wells producing (See Table 1)	11
Storage and boosters (See Table 2)	13

The Department Ground Water Survey Inventory records produced two reports which included data for E & R Water Company Pine system wells. One report (Appendix B) provided the following information:

Driller's Names

Type of Log

Method of Construction

Lift Type

Type of Power

Use of Site

Other data obtained for the Department's computer inventory records (Appendix C) provided the following well data:

Date Completed

Water Use

Casing Diameter

FIN

Depth of Well

Altitude of Land Surface

Water Level

Method of Measurements

Date of Water Level Measurement

D. WATER PRODUCTION MEASUREMENTS

The Department assigned five Hydrology Division field personnel to make measurements of well production and well water levels at Pine on July 15, 1989. Such data was essential to a meaningful analysis of the system capacity. Engineering data in the form of pump head-capacity-efficiency curves were obtained from E & R Water Company for the Pine system wells. The field measurements and pump design data provided the Department with sufficient information to analyze the water source. The source of water must be able to supply a minimal continuous quantity of water of about 83 gpm to the system for use by the systems 1,369 customers to satisfy the curtailment period estimated needs of 120,000 gpd. This amount of water would provide an average of 87 gallons per day to each metered customer. This analysis and projection concerns the well sources only and does not evaluate the capability of the distribution system.

The distribution system consists of different pressure levels which requires the lower elevation system to conserve sufficient water to permit the ground storage and booster pumps to operate and furnish some of the water to the next higher elevation (pressure) water system.

The results of field measurements of wells by the Department's Hydrology Division personnel found three wells with a combined reliable capacity of about 30 gallons per minute (See Table 3). Other wells were inoperative or not arranged for flow measurements. Additional flows might be determined at a later date when instrumentation modifications are made.

TABLE 3
E & R WATER COMPANY WATER LEVEL MEASUREMENTS
July 15, 1989

WELL LOCATION	WATER LEVEL (FT. BLS)	WELL DEPTH (FT)	DISCHARGE (GPM)	COMMENTS
(A-12-8)25AAC, "Berry Hill No. 1"	157.2			Could not isolate system for discharge measurement
(A-12-8)25ADB "Pine Creek Canyon Well"	139.0	190	13.9	Well recently pumped, well would pump for about 5 minutes' 40 seconds and shut off and would recover and start pumping in 1.5 minutes
(A-12-8)26DBA "Well 3"	244.8 pumping level	260	5.8	Well pumped continuously at 5.8 GPM
(A-12-9)30BBD ₂	75.7 pumping level	200	14.0	Well pumped continuously at 14.0 GPM
(A-12-9)30BBD ₃ "South Well"	95.6	170	10.5	Well pumped continuously at 10.5 GPM, pumping level 104.5'

Source: ADWR Field measurements

IV. STATEMENTS AND ACTIONS BY REGULATORY AGENCIES

1. Arizona Corporation Commission.

A moritorium has been in effect for past two years not to approve any water main extensions.

On July 12, 1989, a water curtailment order authorization was approved and will be effective until October 1, 1989.

2. Gila County

Service connections are still being permitted and authorized only in areas approved before the moritorium was implemented.

3. Arizona Department of Water Resources

Advised Gila County Planning Department of services available and requested input to proposed actions - October 16, 1987.

Letter advised Gila County Board of Supervisor on the critical water supply situation at Pine and stated water supply continues to be inadequate - June 10, 1987 (See Appendix D).

Preliminary report June, 1987 on Pine Water Supply concluded:

"The Pine-Strawberry area is reaching its limit with regard to the amount of development that can be sustained with a dependable water supply over a long period of time (100 years)."

3

PAYSON PINE STRAWBERRY

WATER SUPPLY ISSUES

1996

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NOV 1996

ARIZONA DEPARTMENT OF WATER RESOURCES
WATER RESOURCES PLANNING SECTION

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Water Supplies in the
Payson/Pine/Strawberry Area
Information Packet
Prepared By the Arizona Department of Water Resources
April 1996

The beauty and serenity of the Payson/Pine/Strawberry area have been attracting new development for years and, as with most growth areas, water availability has become an issue. The Department of Water Resources (DWR) prepared this information packet to assist the public with understanding the water supply available to this area and DWR's role regarding these supplies.

Water Supplies

Groundwater is the primary source of water in Payson, Pine and Strawberry. In Pine and Strawberry the underlying earth is a fractured limestone, and in Payson it is a fractured granite. In both cases water accumulates in the fractures and can be withdrawn by a well. This supply is very limited and relies on replenishment from rain or snow-melt that percolates through the ground. As a consequence these groundwater supplies are subject to water shortage during dry years, especially during the summertime.

There is some surface water that flows through the area. However, most of this supply is unavailable for use because of water rightholders downstream.

It is important to note that in 1983 the Town of Payson was allocated 4,995 acre feet of Central Arizona Project water. At the time of the allocation, Payson expected to exchange the CAP water for the right to divert surface water from local sources. This, it was hoped, would help to meet Payson's future demands. However, environmental concerns made the exchanges infeasible. In 1994 Payson sold its CAP subcontract to the City of Scottsdale. The money generated from the sale was to fund the acquisition of an alternative source of water (see page 6 of the transfer agreement).

DWR's Role in the Area

Payson, Pine and Strawberry are outside of the statutorily created areas where DWR closely regulates groundwater use, known as Active Management Areas (AMAs). For areas outside of the AMAs, DWR's authority is limited to the administration of the Adequate Water Supply Program and oversight of well drilling in the state.

The Adequate Water Supply Program began in 1973 because of state law makers' concerns over land in Arizona being sold without available long-term water supplies. To address this concern, the Adequate Water Supply Program was designed to ensure disclosure of the water supply situation of a property offered for sale. When DWR was created in 1980, it assumed administration of the program.

Under the law, a developer proposing to offer four or more lots of subdivided or unsubdivided land for sale or lease must demonstrate to DWR if an adequate water supply will be available to satisfy the needs of the proposed development for at least 100 years. Importantly, if the developer does not demonstrate that an adequate water supply exists, the property may still be developed. However, a statement disclosing the lack of an adequate water supply must be documented in the Department of Real Estate's public report on the subdivision and included in all promotional materials and contracts for the development.

Since 1973, the state has analyzed the water adequacy for every new subdivision in the Payson/Pine/Strawberry area to determine if there is enough water available to meet the proposed use for 100 years. Throughout this time, almost all subdivisions in the area have received a Statement of Inadequate Water Supply from the state. The primary reason for the inadequate supply has been the drought sensitive nature of the area.

- During the last 2 decades, subdivisions totalling about 5,100 lots have applied for water adequacy statements, 98% of which have not demonstrated adequacy.

With regard to DWR's authority related to well drilling in Arizona, DWR is responsible for review of wells to ensure that the well is properly constructed. Anyone who wishes to drill a well must file with the DWR a Notice of Intent to drill a well and then comply with DWR well construction standards. DWR records indicate that since 1982 approximately 360 new wells have been registered in the Payson/Pine/Strawberry area.

Area Water Companies

United Utilities, Inc.
Drawer 559
Payson, Arizona 85541
(520) 474-3050

Williamston Water Works
Drawer 559
Payson, Arizona 85541
(520) 474-3050

Town of Payson
303 N. Beeline Highway
(520) 474-5343

For further information please contact Craig Sullivan at the Arizona Department of Water Resources: (602) 417-2408.

Community Profile

Payson

Payson, located at the "heart" of Arizona and a pleasant 90-minute drive from the Phoenix metropolitan area, is renowned for its beauty, recreational opportunities and, more recently, its dynamic business environment.

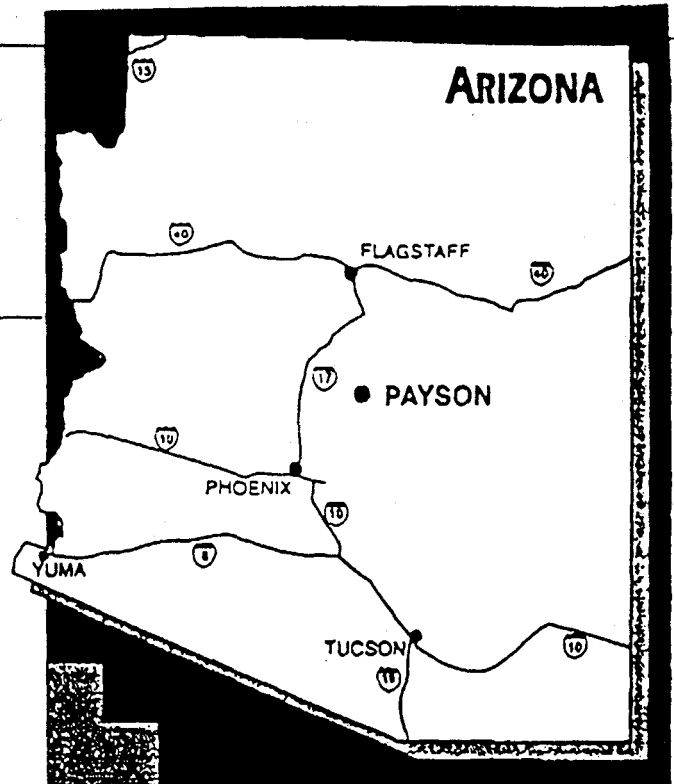
At an elevation of 5,000 feet, the area enjoys a mild four-season climate that attracts visitors from throughout the world the year around. Rich in its Western heritage, Payson - with an average trade area population of some 24,500 - offers the atmosphere of rural America, with the amenities of a metropolis.

PRINCIPAL ECONOMIC ACTIVITIES

The local economy is dominated by the tourism and retirement industries, with a growing emphasis on manufacturing and service firms. Also being encouraged is light industry that is compatible with the community's "High Quality of Life." Many Arizonans and visitors alike migrate to cool Payson in summer. In the winter, the community attracts many visitors who want to enjoy its mild climate and rural atmosphere.

Among the area's major employers are Precision Intricast, Inc. (a precision orthotics devices manufacturer), Custom Aircraft (a home-built airplane assembly and repair firm), and Jacobs Service Company (the world's largest source of Jacobs engine parts). Other major employers include the Gollipops lollipop producer, The Candle Factory, the Payson Regional Medical Center and the Town of Payson.

The Town of Payson Economic Development Department works actively with new and existing business to provide high quality business and employment opportunities for area residents. It operates a revolving loan fund program for use by local and relocating firms requiring low-interest financing. All of Gila County is an Enterprise Zone.



SCENIC ATTRACTIONS

Nestled in the gently rolling hills of the majestic Mogollon Rim - a 7,000-foot, 200 mile long escarpment - Payson is minutes away from the seven Rim Lakes and countless trout streams. Popular outdoor activities include hiking, fishing, camping, cross-country skiing and hunting. One of only three pure air ozone belts in the world, Payson sits on the edge of the world's largest stand of ponderosa pine.

Local attractions include the Tonto National Bridge, Shoo-Fly Indian Archaeological Site, Payson Exotic Zoo, Tonto Fish Hatchery, a Llama Ranch, the town-wide Christmas tree lighting ceremony, and the 10-acre Green Valley Recreation Area. Payson hosts the "World's Oldest Continuous Rodeo" in August. The "Festival Capital of Arizona" season begins with a May Classic Auto Show & Swap Meet, an "Old Timers Rodeo" and Country Music Festival in June, State Championship Loggers/Sawdust in July, Rodeo & Parade in August, and State Championship Fiddlers Contest in September.

POPULATION

	1980	1990	1994
Payson	5,068	8,377	9,505
Gila County	37,080	40,216	43,350
Arizona	2,716,546	3,665,228	4,071,650

Sources: Arizona Department of Economic Security, U.S. Census Bureau
Note: Local sources estimate the trade population to be 24,500.

PAYSON LABOR FORCE DATA*

	1980	1990	1994
Civilian Labor Force	1,891	3,033	3,456
Employed	1,728	2,923	3,316
Unemployed	163	110	140
Unemployment Rate	8.6%	3.6%	4.1%

* Tonto Census Division figures
Source: Arizona Department of Economic Security

GROWTH INDICATORS

	1990	1993	19
Taxable Sales (\$)	93,413,750	109,644,250	122,874,600
Postal Receipts* (\$)	778,117	942,766	1,156,150
New Building			
Permits Issued**	321	327	47
School Enrollment***	1,855	2,430	2,650
Net Assessed			
Valuation (\$)	52,544,663	51,245,713	54,542,900

* Postal receipts are for fiscal year
** Arizona Business - Arizona State University
*** Payson Unified School District

PROPERTY TAX RATE PER \$100 ASSESSED VALUATION

	1990	1993	1994
Unified School District	\$ 6.77	\$ 6.51	\$ 7.38
County	4.06	4.08	4.23
State of Arizona	.47	.47	.47
Community College	.38	.40	.43
Northern Gila County			
Sanitary District	.70	.70	.70
Total Outside Town	\$12.38	\$12.16	\$13.21
Town	.37	.60	.60
Total	\$12.75	\$12.76	\$13.81

Source: Arizona Tax Research Foundation

Note: Property tax in Arizona is based on assessed valuation which is less than market value. Therefore, it is not possible to compute taxes for a particular piece of property based on these numbers

COMMUNITY FACILITIES

Payson offers a broad range of community facilities including a library, museum, indoor theater, golf course, zoo, four lighted tennis courts, auditorium, swimming pool, two parks, a bowling alley and rodeo grounds.

Communication. In addition to communication resources from the rest of the state, Payson has a local weekly newspaper, *The Payson Roundup*, two local radio stations and one television station, and numerous radio and television stations from Phoenix, Tucson, Flagstaff. Cellular and fiber optics are also available.

Educational. Payson has two elementary schools, one junior high school, one high school and a community college (with five degree and three certificate programs).

Medical. The 40-bed Payson Regional Medical Center recently added a new wing which contains an Emergency Room and Trauma Center, pathology and laboratory facilities, three operating suites, outpatient clinics, and an eight-bed recovery unit. Other medical resources are three nursing homes and more than 30 medical professionals including physicians, osteopaths, orthodontists, dentists, optometrists, chiropractors, opticians, and ophthalmologists.

Financial. There are four financial institutions with local offices in Payson. Further, Payson businesses are eligible for assistance in financing assets through the Strategic Finance Division of the Arizona Department of Commerce. Information on private activity bonds within the town may be obtained from the same source or from the Industrial Development Authority of Payson, Payson Economic Development Corporation, Arizona; c/o Director for Economic Development; Payson Town Hall; 303 North Beeline Highway; Payson, Arizona 8541.

Governmental. Payson is governed by a mayor, six council members and a town manager. The town has a local police department, and a fire department is available: the fire department has both full-time and part-time personnel.

Port. Payson Municipal Airport (CTAF 122.8) supports some 1000 operations per year on its lighted 5,500-foot runway and has FBO, fueling and maintenance facilities.

Industrial Properties. There are two industrial parks available, one located at the juncture of state Highway 87 and state Highway 260, the other adjacent to Payson Municipal Airport. For additional information, contact the Director for Economic Development, Town of Payson.

Utilities

Electricity:	Arizona Public Service	(520) 474-2204
Propane:	Broken Bow Gas Company	474-2294
	Northern Energy	474-3334
Telephone:	U.S. West Communications	490-2355
Water:	Town of Payson	474-5242
	Utility Management & Operation Services	474-2100
Sewer:	Northern Gila County	
	Sanitary District	474-5257

Lodging and Meeting Facilities. Payson is home to nine motels with a total of approximately 470 rooms; meeting facilities are available, with the largest seating 200 people. Additionally, the area offers several bed and breakfast and cabin facilities, as well as nine RV parks and six campgrounds.

WEATHER

Month	Average Temperature (°F)		Average Total Precipitation (inches)	Month	Average Temperature (°F)		Average Total Precipitation (inches)
	Daily Max	Daily Min.			Daily Max	Daily Min.	
January	53.1	23.7	2.11	August	89.2	57.0	3.30
February	57.2	25.8	1.43	September	85.2	49.8	1.85
March	61.4	28.4	1.78	October	75.5	40.0	1.64
April	70.0	34.7	0.96	November	63.3	30.5	1.45
May	79.8	41.2	0.43	December	55.2	24.5	2.21
June	86.9	49.0	0.50				
July	92.5	56.5	3.10	Year	72.5	38.6	20.77

Average Total Snow, Sleet and Hail Annually: 25.1 inches
(Based on a 30-year average)

This community profile was prepared by the Arizona Department of Commerce Communication and Research Division in cooperation with the Payson Chamber of Commerce.

For further information, contact:

Payson Chamber of Commerce
P.O. Box 1380
Payson, AZ 85547
(520) 474-4515

Town of Payson
303 N. Beeline Hwy.
Payson, AZ 85541
(520) 474-5242
Fax 474-4610

Payson Economic Development Corp.
303 N. Beeline Highway
Payson, AZ 85541
(520) 474-5242
Fax 474-4610

Bulk orders and complete sets of profiles may be obtained at moderate cost from the Arizona Department of Commerce by calling (602) 280-1321.

Arizona Department of Commerce
3800 N. Central Ave., Ste. 1400
Phoenix, AZ 85012
(602) 280-1321
FAX: (602) 280-1305

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6/95

Community Profile

Pine/Strawberry

Pine and Strawberry are rapidly growing vacation and retirement centers in the north central part of the state. Pine is at an elevation of 5,448 feet and is named for the surrounding pine timber country. The community's post office was founded in 1884. Strawberry, at an elevation of 6,047 feet, was named for the wild strawberries that grow in the area. The communities are about 110 miles northeast of Phoenix and are unincorporated. The area has four seasons, but none are severe: although snow falls in the winter, it usually melts quickly.

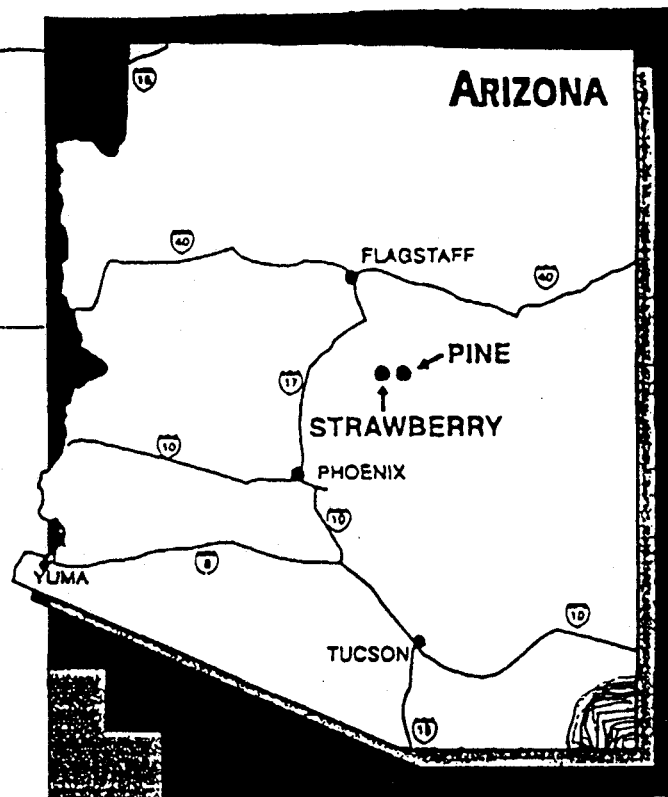
PRINCIPAL ECONOMIC ACTIVITIES

As vacation and retirement centers, the commercial sectors of both communities rely heavily on weekend tourists and second-home residents. With the growth in the area, light industry manufacturing development is being encouraged. Some residents travel to Payson for employment; however, most non-tourist related income comes from construction and service-related businesses.

SCENIC ATTRACTIONS

The beautiful pine-clad country around Pine and Strawberry and the Blue Ridge Reservoir, Bear Canyon Lake and Knoll Lake offer many recreational opportunities and facilities. Forest Service campgrounds in the 7,000-foot Mogollon Rim area are plentiful. Fishermen enjoy the abundant trout streams, and elk, deer, turkey, antelope, bear and mountain lion hunting is permitted.

Scenic drives in the area abound. Two prime examples include Control Road which winds along the base of the Mogollon Rim, and Mogollon Rim Road, part of the historical General Crook Military Road, which follows along the edge of the rim. Another must-see site is the Tonto Natural Bridge. This natural wonder is the largest travertine bridge in the world and is operated as a State Park. Hikers, horseback riders and backpackers enjoy scenic Pine Trailhead located at the southern edge of Pine. There is also



a walking tour of historic buildings in Pine and Strawberry.

The Chamber of Commerce and the Historical Society host a Strawberry Festival on the same day in June that the Kiwanis Club sponsors a Chili Cookoff. A shuttle bus provides transportation between the two events. The Chamber also hosts a fireworks display on July 2, and there is an Old Fashioned Ice Cream Social sponsored by the Homemakers on July 22, followed by the community picnic on July 23.

On each Saturday of the three holiday weekends, Memorial Day, the Fourth of July and Labor Day, there is an early morning Cowboy Breakfast sponsored by the Tonto Rim Search and Rescue Squad. Arts and Craft Festivals are held on the same weekends.

Pine also hosts the Pine Country Fair and Strawberry boasts the oldest schoolhouse in Arizona (now a state historical site).

POPULATION

	1980	1990	1994
Pine/Strawberry*	1,250	3,550	3,704
Gila County	37,080	40,216	43,350
Arizona	2,716,546	3,665,228	4,071,650

Sources: Arizona Department of Economic Security and U.S. Census Bureau

*According to the Pine/Strawberry Chamber of Commerce, the population increases to approximately 5,000 during the summer months. 1994 estimate projected from growth rates.

LABOR FORCE DATA*

	1980	1990	1994
Civilian Labor Force	3,352	2,865	3,190
Employed	3,037	2,564	2,807
Unemployed	315	302	383
Unemployment Rate	9.4%	10.5%	12.0%

Source: Arizona Department of Economic Security

* Tonto Census Division figures. 1994 estimate based on County labor force.

GROWTH INDICATORS

	1990	1993	1994
Postal Receipts *(\$)	114,185	149,184	N
Elementary School Enrollment	256	289	295
Net Assessed Valuation (\$)**	20,980,677	21,315,755	22,403,037

* Postal receipts are for fiscal year

** Fire District, Pine #1.

Pine/Strawberry

PROPERTY TAX RATE PER \$100 ASSESSED VALUATION

	1990	1993	1994
Elementary	\$ 5.73	\$ 5.87	\$ 5.98
County	4.06	4.08	4.23
State of Arizona	.47	.47	.47
Community College	.38	.41	.43
Total Outside Community	\$10.64	\$ 10.83	\$11.11
Fire District	1.64	1.73	2.15
Fire Lighting District	.11	.14	.10
Total	\$12.39	\$12.70	\$13.36

Source: Arizona Tax Research Foundation

Note: Property tax in Arizona is based on assessed valuation which is less than market value. That means it is not possible to compute taxes for a particular piece of property based on these numbers.

COMMUNITY FACILITIES

There are many community facilities in both nearby Payson and Pine. Payson has one indoor theater, a zoo, an 18-hole golf course, rodeo grounds, three tennis courts, a library and one park. Pine offers a library, a museum, a park, a roping arena and a community center.

Communication. In addition to communication resources from the rest of the state, Pine/Strawberry has weekly and quarterly area newspapers, a local AM and FM station, and nine television channels from Phoenix, Flagstaff, Tucson and Prescott; also cable TV with 11 channels.

Educational. There is one public elementary school; high school students attend school in Payson. The Gila Pueblo Community College has classes in Payson and Pine.

Medical. Pine/Strawberry has one medical clinic with a nurse practitioner and three nursing homes. Complete medical facilities are available in Payson, 15 miles south.

Financial. Five financial institutions are located in Pine and Payson. Further, Gila County businesses are eligible for assistance in financing and assets through the Strategic Finance Division, Arizona Department of Commerce. Information on private activity bonds within the county may be obtained from the same source or from the Industrial Development Authority of Gila County, Gila County Planning & Zoning Dept., 1400 E. Ash, Globe, Arizona 85501.

Governmental. Pine/Strawberry is governed by the Gila County Board of Supervisors and served by the sheriff's department and highway patrol. The fire department has two stations, 10 full-time firefighters/paramedics, 13 part-time firefighters/EMTs, and 27 volunteer firefighters/EMTs.

Port. Residents of the area have access to the Payson Airport (15 miles away), which has one paved, lighted 5,000-foot runway.

Utilities

Electricity:	Arizona Public Service	(520) 474-2204
Gas:	Aztec Butane Co.	474-3334
	Broken Bow Gas Co.	474-2294
Phone:	U.S. West Communications	(800) 244-1111
Water:	Utility Management & Operations Services	474-2100
	Septic systems	

Lodging and Meeting Facilities. There are six motels with 44 units and four meeting facilities, with the largest seating 125 persons. There are also four trailer parks in the area.

WEATHER*

Month	Average Temperature (°F)		Average Total Precipitation (Inches)	Month	Average Temperature (°F)		Average Total Precipitation (Inches)
	Daily Max.	Daily Min.			Daily Max.	Daily Min.	
January	53.1	23.7	2.11	August	89.2	57.0	3.30
February	57.2	25.6	1.43	September	58.2	49.8	1.86
March	61.4	28.4	1.78	October	75.5	40.0	1.64
April	70.0	34.7	0.96	November	63.3	30.5	1.45
May	79.0	41.2	0.43	December	55.2	24.5	2.21
June	88.9	49.0	0.50				
July	92.5	58.5	3.10	Year	72.5	38.6	20.77

* Payson Reporting Station Elevation: 4,913 feet
Average Total Snow, Sleet and Hail Annually: 25.1 inches
Area temperatures differ 5 to 7 degrees cooler than Payson reporting station (based on a 30-year average)

This community profile was prepared by the Arizona Department of Commerce Communication and Research Division in cooperation with the Pine/Strawberry Chamber of Commerce.

For further information, contact:

Pine/Strawberry Chamber of Commerce
Box 196
Pine, AZ 85544
(520) 476-3547

Gila County Board of Supervisors
1400 East Ash
Globe, AZ 85501
(520) 425-3231

Bulk orders and complete sets of profiles may be obtained at moderate cost from the Arizona Department of Commerce by calling (602) 280-1321.

Arizona Department of Commerce
3800 N. Central Ave., Ste. 1400
Phoenix, AZ 85012
(602) 280-1321
FAX: (602) 280-1305

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6/95

Water Supply of the Pine-Strawberry Area
Gila County Preliminary Report
June 1987

Arizona Department of Water Resources
Hydrology Division
Payson/Pine/Strawberry File
1987

Water Supply of The
Pine-Strawberry Area, Gila County
Preliminary Report
June 1987

Groundwater is the source of the water supply for most of the residents in the Pine-Strawberry Area. Only a small part of the water demand is satisfied with surface water from Pine Creek in the Pine Creek area.

To study the groundwater supply situation in the Pine-Strawberry area, the following sub-areas were considered:

(1) The Pine Creek Area

Pine Creek originates at the Mogollon Rim where groundwater, probably from the Coconino Sandstone aquifer, surfaces as springs. This stream becomes a losing stream around section 19 where the E&R Water Company's franchise area starts. The "lost" surface water recharges an aquifer which consists of Mudstone/Shale/Limestone deposits restricted laterally by the Coconino Sandstone formation. The groundwater travels through this aquifer for about 7000 feet, within the water company's franchise area, before it enters the Redwall limestone formation. This formation acts as a drain bringing the groundwater to very deep levels. Dry wells to depths of about 850 feet have been drilled in this zone which covers about one-half of the E&R Water Company franchise area.

A large increase in the groundwater elevation in the Mudstone/Shale/Limestone aquifer occurred between 1977 and 1987. This variation is probably associated with the "wet" period that occurred within those years. In spite of the abundance of precipitation within that period, water elevations in the lateral

Sandstone aquifer did not show any gains, but suffered severe declines (1.5-13.4 ft/yr). This probably caused by the limited vertical extent and the fractured nature of this aquifer, which lacks the storage capacity of the Mudstone/Shale/Limestone aquifer. A conservative estimate of the groundwater in storage in the Mudstone/Shale/Limestone aquifer yielded a value of about 2160 acre-feet.

The groundwater flux coming from the northeast paralleling Pine Creek was estimated to be about 11.0 AF/yr. The groundwater flux coming laterally from the sandstone formation was estimated to amount to about 226 AF/yr.

(2) Strawberry Hollow Area

Similar geohydrologic conditions, although more accentuated, exist at Strawberry Hollow. The extent of the Mudstone/Shale/Limestone aquifer is more limited and the groundwater reaches the Redwall limestone formation which acts more rapidly as a drain. The groundwater in storage within this area was estimated to be about 1400 acre-ft., and the groundwater flux from the northwest paralleling Strawberry Hollow, about 38 AF/yr.

(3) Strawberry Creek Area

In this area the Mudstone/Shale/Limestone aquifer extends for about 840 acres. Using a conservative saturated thickness of 135 ft., the groundwater in storage underneath this area is about 5670 Acre-ft. The groundwater flux entering this area was estimated to be about 79 AF/yr.

In summary, the Pine-Strawberry area counts on a dependable water supply of about 447 AF/yr (Table 1) for satisfying its water demands.

Table 1
Groundwater Available
Pine-Strawberry Area

<u>Area</u>	<u>Groundwater In</u> <u>Storage *(AF/YR)</u>	<u>Groundwater</u> <u>flux (AF/YR)</u>	<u>Total</u> <u>(AF/YR)</u>
Pine Creek	22	237	259
Strawberry Hollow	14	38	52
<u>Strawberry Canyon</u>	<u>57</u>	<u>79</u>	<u>136</u>
Total	93	354	447

*Amount in storage distributed over 100 years.

Analysis of The Demand

The water demand in the Pine-Strawberry area has increased enormously in the last 8 years. From a total water demand of about 163 AF/yr in 1979 to about 384 AF/yr in 1986, a 135% increase in water use for that period.

The drilling of new private domestic wells plus new irrigated areas account for a large part (@ 69%) of that increase. In 1979 there were about 96 private wells registered with the Department. In 1986, this number had increased to about 164. The irrigated area, for the same period, increased from 27 to about 119 acres. The water companies, on the other hand, have increased their water demands, at a more or less constant and slower pace (@ 9 AF/yr).

Supply vs Demand

Comparison of the total water demand with the total dependable water supply, in figure 1, indicates that in 1986 the Pine-Strawberry area was using about 86% of its dependable supply. In spite of the large percentage of dependable supply used, the Mudstone/Shale/Limestone aquifer showed gains, not declines, in water levels.

Comparison of the water elevation data for 1974 and 1987 indicates that water levels in the Mudstone/Shale/Limestone aquifer have increased $\pm(1.4-8.4$ ft/yr). As mentioned previously, these increases are a direct response of the aquifer to the natural replenishment from the excess precipitation that occurred between 1979-1986.

If the water demand continues increasing at the present rate, in about 2 more years the Pine-Strawberry area will be using 100% of its dependable supply. After that, additional future demands will be accelerating the overdraft of the aquifer. If a "Dry" period were to occur severe declines might occur.

Conclusions

- (1) The Pine-Strawberry area is reaching its limit with regard to the amount of development that can be sustained with a dependable water supply over a long period of time (100 years).
- (2) The available groundwater level data cover a "wet" period. Therefore, it is unknown how the Mudstone/Shale/Limestone aquifer will respond to a "Dry" period. Continuous groundwater monitoring is essential.
- (3) The relationship between spring flow and groundwater level variations is

unknown. Monitoring is needed to evaluate the amount of replenishment caused by the Pine Creek stream.

(4) The hydraulic parameters (T and Sy) used to estimate the groundwater in storage and the groundwater flux are uncertain, although they might be on the conservative side.

(5) The area south and east of Pine is a non-productive water zone. The water levels in the Redwall limestone are too deep for efficient and economical use.

(6) Surface water rights in the Pine-Strawberry area are going to be subject to the on-going adjudication process.

mb

ATTACHMENT IV.

ARIZONA DEPARTMENT OF WATER RESOURCES ADEQUATE WATER SUPPLY PROGRAM

HISTORY OF THE ADEQUATE WATER SUPPLY PROGRAM

A person who wishes to subdivide and sell land in Arizona must obtain a Public Replot from the Arizona Department of Real Estate and record a plat of the subdivision with the County. Before a Public Report may be issued or before a County can approve and record a subdivision plat, a Water Supply Adequacy Report must be issued by the Arizona Department of Water Resources (ADWR).

The Adequate Water Supply Program began in 1973 with the enactment of legislation aimed at controlling land fraud in Arizona. In the late 1960s and early 1970s thousands of unimproved lots in Arizona were being marketed and sold without consideration for the availability or long-term dependability of the water supply. The legislation created a water adequacy statute which required the evaluation of the available water supply and disclosure of any inadequacy of the supply to potential lot buyers. The responsibility for evaluating subdivision water supplies was assigned to the Arizona Water Commission, an agency which was replaced in 1980. The Adequate Water Supply (ADWS) Program was continued in the Code with no changes except to limit it to areas outside the Active Management Areas.

The responsibility for demonstrating an adequate water supply is on the subdivider. However, if the owner cannot demonstrate the adequacy of the supply (or chooses not to), the supply may be determined *inadequate* by DWR. Sales of such properties may still proceed provided disclosure of the inadequacy of the water supply is made in promotional materials as required by the Arizona Department of Real Estate.

A general description of the process for obtaining a Water Adequacy Report¹ as well as the current physical criteria used in making an adequacy determination are presented in the following sections of this brochure.

¹The terms *adequacy* and *Water Adequacy Report* refer to determinations by DWR on the adequacy of the water supply regardless of whether the supply is judged to be *adequate* or *inadequate*.

SUBDIVISION REQUIREMENTS AND ADEQUATE WATER SUPPLY

A Water Adequacy Report must be obtained before the county can record the plat and before the Department of Real Estate can issue a public report. A subdivision is currently defined as land consisting of six or more lots or parcels of which at least one is less than 36 acres in area. Land divisions of six or more parcels each of which is greater than 36 acres is defined as unsubdivided land and is not subject to the ADWS program.

A subdivider can demonstrate the adequacy of the water supply in either of two ways:

1. The subdivision may be able to be supplied water from a water provider which has been designated by DWR as having an Adequate Water Supply; or
2. The subdivider may independently obtain a Water Adequacy Report for the subdivision from DWR.

If the subdivider needs to obtain a Water Adequacy Report, the application and issuance of the report must be completed prior to having the final plat recorded by the local County Recorder for each particular subdivision.

METHODS OF DEMONSTRATING AN ADEQUATE WATER SUPPLY

1. Water Service by a Designated Water Provider

Water providers which are designated by DWR as having an adequate water supply, may include cities, towns and private water companies. These designated providers have previously satisfied the Department's criteria for demonstrating an adequate water supply for their current, committed and projected customers.

Water providers which are not currently designated may apply at any time for a designation of adequate water supply. The process that water providers must follow to become designated is discussed below under Obtaining a Designation of Adequate Water Supply.

A list of currently designated providers is available from DWR. If service from a designated water provider is not available, the developer must apply to DWR for a Water Adequacy Statement.

2. Water Adequacy Report

To obtain a *Water Adequacy Report*, the owner of the proposed subdivision must file an application with the Department of Water Resources. If the Department determines that the application meets the ADWS criteria then a *Water Adequacy Report* is issued. If the application does not comply with ADWS criteria, then the applicant may either submit additional information to try to demonstrate an adequate water supply or an applicant may choose not to demonstrate adequacy and receive an *Inadequacy Report*. The processing time for typical applications for Water Adequacy Reports may vary from two weeks to two months depending on the nature of the review.

The process for securing a *Water Adequacy Report* for a subdivision is discussed below in the section Obtaining a Water Adequacy Report.

ADEQUATE WATER SUPPLY CRITERIA

To demonstrate an Adequate Water Supply, an applicant for a Water Adequacy Report, Designation of Water Adequacy or Analysis of Adequate Water Supply must satisfy the following criteria which are described in the 1995 Assured and Adequate Water Supply Rules. These criteria and the associated rule citations are:

1. Physical, legal and continuous availability of the water supply (R12-15-717).
2. Sufficient quality of the water supply (R12-15-718).

These criteria, which have been required since 1980, are described in greater detail in the Rules as well as in an informational handout titled *Hydrologic Studies for Assured and Adequate Water Supplies - Guidelines* available from the Hydrology Division of DWR. The important aspects of the criteria are discussed in the following sections.

OBTAINING A WATER ADEQUACY REPORT

As previously discussed, prior to a subdivider/owner obtaining a Commissioner's Public Report for the subdivided land, an *Application for A Water Adequacy Report* must be filed with DWR. If the subdivider is attempting to demonstrate the adequacy² of the water supply, information must be provided to DWR regarding the adequate water supply criteria.

²In discussing the criteria, it is assumed that the applicant is choosing to demonstrate that an adequate water supply is available. *Inadequacy* determinations do not require compliance with the criteria.

Physical, Legal and Continuous Availability; R12-15-717 (Physical Availability)

The applicant must describe the sources of water to be served to the subdivision. This involves demonstrating that:

1. Water is physically and continuously available to the subdivision to meet its demand for at least 100 years, and that the water is of suitable quality. In most cases this is typically demonstrated through a hydrologic study which is submitted with the application, unless the entity providing water has previously submitted a valid study to the Department. Evidence of a legal right to the water supply of supplies may also be required.

2. A legally recognized water provider has committed to supply service. If the subdivision is to be served by a private water company, the proposed subdivision must be within the area prescribed in the company's Certificate of Convenience and Necessity. If a system does not presently serve the area, two options exist;

a) a new water company or co-op may be established in accordance with the applicable Arizona Corporation Commission, Department of Environmental Quality and DWR requirements; or

b) the subdivision may be developed as a "dry lot subdivision" where individual domestic wells will be drilled on each lot by the purchasers.

The rules contain specific standards for different sources of water including groundwater, surface water, Colorado River water, Central Arizona Project water, effluent and storage credits. These are discussed below:

Groundwater

If the proposed source of water is groundwater, a hydrologic study of the affected area must be submitted with the application unless previously submitted. Groundwater is considered physically available only if certain depth-to-static water level criteria are not exceeded in 100 years as follows:

areas outside of AMA's/other
than dry lot subdivisions

1200 feet below land surface

dry lot subdivisions

400 feet below land surface

Surface Water, Colorado River Water and Central Arizona Project Water

If the applicant has a long-term, non-declining municipal and industrial CAP subcontract or a

lease for Indian priority CAP water, the entire amount of the subcontract is considered as physically available. For other CAP, Colorado River water and surface water sources, only certain "reliable" percentage of the amount in the contract, right or lease can be considered unless a backup supply of water has been demonstrated. A backup supply may be shown by a drought response plan, recharge credits or evidence of other backup supplies which are continuously and legally available.

The applicant must also show that there is legal availability of the proposed supplies and that there are adequate storage facilities for surface water and CAP during periods of shortage due to drought or system repairs.

Effluent

If effluent will be used directly, the applicant must include an evaluation of the annual volume that will be continuously available and show that its use will comply with ADEQ water quality requirements. Evidence must also be shown that the applicant has the legal right to use, capture or reuse the effluent and that there is an actual demand for the water.

Long-Term Underground Storage Credits

Evidence of credits already accrued must be shown or, if not already accrued, that the applicant is the permit holder, that there is an existing storage project available (or that construction is imminent), that a contract for storage water exists, and that the applicant has physical, continuous and legal availability of the water to be stored.

Water Exchange Agreements

In the case of water exchange agreements the applicant must show physical and continuous availability according to the actual source of water used as discussed above. Legal availability is satisfied through evidence that the agreement is in accordance with the requirements of ARS Title 45.

Water Quality; R12-15-718

The applicant's proposed source(s) of water must satisfy existing state water quality standards as well as other water quality standards applicable to the proposed use after treatment. The Department will consider the possible migration of poor quality water that may impact the applicant's source. Designated providers must continue to satisfy all applicable state water quality requirements in order to maintain their designation.

Fees

Application fees for a Water Adequacy Report range from \$200 to \$800 depending on the number of lots. A discount applies if a hydrologic study was previously submitted for the area.

OTHER ADEQUATE WATER SUPPLY REQUIREMENTS

Review, Modification or Revocation of a Designation (R12-15-720)

The Department will review the Adequate Water Supply Status of designated water providers at least every 15 years to determine whether the designation should be modified or revoked. In addition, the holder of a designation may request a modification of the designation at any time. For example, the provider may have obtained additional water supplies to satisfy its demand.

If an adequate water supply no longer exists after a designation is issued, the Department may revoke the designation.

Annual Reports (R12-15-722)

Designated water providers must submit water demand and supply information is annual water withdrawal and use reports. This includes information on new customer demand, a water quality report and depth to static water level from service area wells.

ARIZONA DEPARTMENT OF WATER RESOURCES

Hydrology Division

500 North Third Street, Phoenix, Arizona 85004
Telephone (602) 417-2448
Fax (602) 417-2425



FIFE SYMINGTON
Governor

RITA P. PEARSON
Director

March 15, 1996

Mr. Roy Tanney
Chief of Subdivisions
Department of Real Estate
2910 North 44th Street
Phoenix, Arizona 85018

RE: *Water Adequacy Report #22-300113*
Lovett Place, Gila County

Dear Mr. Tanney:

Pursuant to A.R.S. §45-108, R.D.B., Inc., has provided the Department of Water Resources with information on the water supply for the above-referenced subdivision in Section 28, T11N, R10E, G&SR B&M.

Water for domestic use will be provided to each of the 18 lots in the subdivision by the Town of Payson. Adequacy of the water supply was reviewed by the Department with regard to quantity, quality, and dependability. The subdivision, located in the Town of Payson, Arizona, is underlain by a fractured granite aquifer. Depth-to-water in the town's municipal wells ranges from about 10 to 240 feet below land surface, depending upon topography and well location. Although some of the municipal wells near the center of town have experienced water-level declines of several feet per year, water wells in other areas of town show seasonal fluctuations but no trend of progressive declines. The fractured nature of the aquifer makes the area drought-sensitive. Little is known about the groundwater potential of the area. Even though successful wells in the area supply current demand, their effect on long-term groundwater supply is unknown. For this reason, the water supply is considered *inadequate*.

A.R.S. §32-2181.F. requires a summary of the Department's report for dry lot subdivisions or for those with an inadequate water supply be included in all promotional material and contracts for sale of lots in the subdivision. We suggest the following synopsis:

"Lovett Place is a residential subdivision being sold with a domestic water supply furnished by the Town of Payson. A fractured granite aquifer underlies the area. Depth-to-water in the town's municipal wells ranges from about 10 to 240 feet below land surface. In general, the Payson area water supply is drought-sensitive. The Department of Water Resources, therefore, considers the water supply to be *inadequate*."

The developer, pursuant to A.R.S. §32-2181.F., may suggest a different summary of this report, but it must contain the above elements and/or the Department's findings. Any change to the above subdivision or water supply plans may invalidate this decision.

PW 0001-000145

Page 2
Mr. Roy Tanney
Lovett Place
March 15, 1996

This letter, which constitutes the Department of Water Resources' report on the subdivision water supply, is being forwarded to your office as required by A.R.S. §45-108. This law requires the developer to hold the recordation of the above subdivision's plats until the receipt of the Department's report on the subdivision's water supply. By copy of this report, the Gila County recorder officially is being notified of the developer's compliance with the law.

If you have any questions regarding this report, please call Genie Howell at 417-2400 ext 7181.

Sincerely,



Greg Wallace
for Chief Hydrologist

GW/GH

cc: R.D.B., Inc.
Town of Payson Water Department
Ms. Linda Ortega, Gila County Recorder
Mr. Robert Bigando, Jr., Gila County Planning & Zoning
Ms. Tami Gustafson, ADEQ Technical Review Unit
Mr. Steve Rossi, ADWR

ARIZONA DEPARTMENT OF WATER RESOURCES

HYDROLOGY DIVISION

MEMORANDUM

TO: Greg Wallace

FROM: Steven Szyprowski/Genie Howell

DATE: October 17, 1995

RE: Concern About Status of Long-term Water Supply for the Town of Payson Area

FOR: ☐ action ☐ decision ☒ information

The year-to-date issuance of *Inadequacy* Statements for Payson area subdivisions totaling 903 lots raises concern about resolution of a source of long-term water supply for this rapidly growing area. All *Water Adequacy Statements* issued since August 08, 1973, have been *inadequate*. The lot total since 1973 is 2976 lots; therefore, this year-to-date total of 903 lots represents 30% of the total over the 22-year period.

NAME	REPORT TYPE	HYDRO REV CMPLT	LOTS	WATER PROVIDER
Spine Heights	INADE	7/11/78	257	United Utilities
Spine Ridge	INADE	1/12/82	7	Payson, Town of
Spine Village #1	INADE	7/16/85	312	Payson, Town of
Malet Village	INADE	12/27/74	48	United Utilities
Maparral Ranch	INADE	2/23/95	14	Payson Water Dep
Ark Ridge	INADE	10/05/95	108	Payson, Town of
Emergreen Meadows	INADE	8/11/75		dry lot
Airway Oaks Estates replat	INADE	3/10/83	23	Payson, Town of
Falcon View	INADE	10/03/95	57	Payson, Town of
Forest Park	INADE	2/08/80	121	United Utilities
Forest Park	INADE	8/11/88	10	Payson, Town of
Forest Park #1	ADE	8/08/73	12	United Utilities
Forest Park Addition #1	INADE	5/20/80	28	United Utilities
Four Seasons North	INADE	5/18/83	48	Payson, Town of
Frontier Condominiums	INADE	1/24/96	42	Payson, Town of
Frontier Townhouses	INADE	6/17/80	8	United Utilities
Olden Frontier #1	INADE	1/17/80	112	United Utilities
Olden Frontier #2	INADE	8/15/84	87	Payson, Town of
Granite Dells Estates	INADE	1/19/77		dry lot
Green Valley Estates	INADE	4/26/94	53	Payson, Town of
Greenfaire	INADE	10/27/94	11	Payson, Town of
Holls, The #01	INADE	8/24/93	34	United Utilities
Holls, The #02	INADE	3/28/94	22	United Utilities
Holls, The #03	INADE	9/19/95	27	United Utilities
Holls, The #03	INADE	1/11/96		United Utilities
Wett Place	INADE	3/15/96	18	Payson, Town of
Manzanita Hills #1	INADE	1/17/95	11	Payson, Town of
Manzanita Hills #2	INADE	1/18/95	22	Payson, Town of
Mountain-Aire Condominiums	INADE	6/14/82	4	Payson, Town of
Mountain-Aire Condominiums #3	INADE	9/10/85	8	Payson, Town of
Payson Industrial Park	INADE	11/08/88	13	Payson, Town of
Payson Meadows	INADE	8/07/86	32	Payson, Town of
One Aire	INADE	3/18/80	12	United Utilities
Trail Valley	INADE	4/30/82	160	United Utilities
Trail Valley	INADE	3/17/87	9	United Utilities
Trail View Heights Estates	INADE	3/21/88	101	Payson, Town of
Trail Park Industrial	INADE	12/29/83	64	Payson, Town of
Trail Valley Vista	INADE	3/18/87	12	United Utilities
Streams at Payson, The #1	INADE	9/06/85	72	Payson, Town of
Trailwood #1	INADE	4/14/94	104	Payson, Town of
Trailwood #2	INADE	12/07/94	86	Payson, Town of
Trailwood #3	INADE	7/26/95	123	Payson, Town of
Western Manor	INADE	12/27/74	26	United Utilities
Trailwood	INADE	7/20/83	99	Payson, Town of
Under Valley	ADE	8/22/75		Co-op water syst
Trailhill #1-8	INADE	5/31/95	396	Payson, Town of
Trailland Meadows #1 amended	INADE	1/06/81	102	Payson, Town of
Trailland Meadows #2	INADE	11/09/82	91	Payson, Town of
Trailland Meadows #3	INADE	6/20/84	84	Payson, Town of
Trailland Meadows #4	INADE	4/12/88	24	Payson, Town of

4/24/96

Pine/Strawberry Subdivisions

NAME	REPORT TYPE	LOTS	WATER PROVIDER
Spine Heights	INADE	257	United Utilities Company
Malet Village	INADE	48	United Utilities Company
Ammaron Pines	INADE	264	E & R Water Company
Eagle Glen Townhouses	INADE	57	E & R Water Company
Busive Acres	INADE	30	United Utilities Company
Brest Park	INADE	121	United Utilities Company
Brest Park #1	ADE	12	United Utilities Company
Brest Park Addition #1	INADE	28	United Utilities Company
Frontier Townhouses	INADE	8	United Utilities Company
Golden Frontier #1	INADE	112	United Utilities Company
Devremont	INADE	10	E & R Water Company
Hidden Pines	INADE	49	Williamston Water Works
Hemstead, The	INADE	25	E & R Water Company
Mont Ranch #01	INADE	8	E & R Water Company
Holls, The #01	INADE	34	United Utilities, Inc.
Holls, The #02	INADE	22	United Utilities, Inc.
Holls, The #03	INADE	27	United Utilities, Inc.
One Aire	INADE	12	United Utilities Company
Hail Valley	INADE	9	United Utilities Company
Hail Valley	INADE	160	United Utilities Company
Altitude Pines #1	INADE	115	E & R Water Company
Altitude Pines #2,5	INADE	255	E & R Water Company
Altitude Trails	INADE	73	E & R Water Company
Star Valley Vista	INADE	12	United Utilities Company
Strawberry Mountain Shad	ADE	134	E & R Water Company
Strawberry Mountain Shado	INADE	264	E & R Water Company
erra Pine	ADE	30	E & R Water Company
Alnut Glen	ADE	29	E & R Water Company
Western Manor	INADE	26	United Utilities Company

Payson/CAP Allocation

In 1983 the Town of Payson was allocated 4,995 acre feet of Central Arizona Project water per year. However, environmental concerns made the exchange infeasible. This water was offered to Scottsdale and the documents that follow were developed as part of the agreement to transfer the water to the city. The documents include the Memorandum of Understanding, the Agreement between the effected parties to exchange, and the Trust Agreement.

Memorandum of Understanding .. 1-4
Agreement to exchange .. 1-12
Trust agreement .. 1-5

MEMORANDUM OF UNDERSTANDING

For the Creation of a Trust Fund between the Town of Payson and the United States of America

This Memorandum of Understanding (this "Memorandum") is made as of the 21st day of January, 1994 by and between the TOWN OF PAYSON ("Payson"), an Arizona municipal corporation, whose address is 303 North Beeline Highway, Payson, Arizona 85541, and the UNITED STATES OF AMERICA acting through the BUREAU OF RECLAMATION ("BOR"), whose address for purposes of this Memorandum is Regional Director, Lower Colorado Region, Bureau of Reclamation, P.O. Box 61470, Boulder City, Nevada 89006-1470.

Background

A. Payson has entered into that certain agreement entitled "Agreement Among the Town of Payson, Southwest Community Resources, Inc., the City of Scottsdale, the Central Arizona Water Conservation District and the United States for the Exchange of Central Arizona Project Water" (the "Exchange Agreement"). Section 6.1 of the Exchange Agreement provides that, subject to the terms and conditions thereof, the sum of \$4,318,796 plus certain accrued interest will be deposited into a trust fund (the "Trust Fund") created pursuant to the Trust Agreement (the "Trust Agreement") attached as Exhibit B to the Exchange Agreement.

B. Section 4.2 of the Exchange Agreement and Section 2 of the Trust Agreement provide that monies in the Trust Fund may only be used for purposes (the "Trust Fund Purposes") of defraying the expenses associated with investigating, planning, designing, constructing, acquiring and/or developing an alternative water supply to replace the Central Arizona Project water assigned by Payson pursuant to the Exchange Agreement, up to a combined net increase in Payson's water system capacity of 4995 acre-feet per year.

C. Payson desires to reserve a portion of the monies in the Trust Fund for use in projects which meet the Trust Fund Purposes and which also benefit the environment, principally in the area of riparian creation, enhancement and preservation. The BOR desires to facilitate the achievement of these twin goals by Payson by entering into this Memorandum.

IN CONSIDERATION of the foregoing and the mutual covenants contained herein, the parties agree as follows:

1. Conditions Precedent to Effectiveness. The obligations of Payson and the BOR hereunder and the other provisions of this Memorandum shall become effective upon the funding of the Trust Fund.

2. Reservation of Trust Monies for Environmental Purposes. Of the monies deposited in the Trust Fund, the sum of three hundred twenty-five thousand dollars (\$325,000) (the "Environmental Portion") is declared to be reserved and held in trust for use in projects ("Environmental Projects") both benefiting the environment and meeting the Trust Fund Purposes.

3. Administration of the Environmental Portion. Although the monies in the Trust Fund will remain in the actual custody and control of the financial institution selected to serve as trustee under the Trust Agreement, the BOR shall act as an additional trustee with respect to the Environmental Portion. Payson shall exercise its powers under Section 6 of the Trust Agreement to direct the investment of the monies in the Trust Fund so as to establish separate accounts within the Trust Fund into which the Environmental Portion shall be deposited or separate investments within the Trust Fund which shall be made with the Environmental Portion. No monies from the Environmental Portion shall be spent without the prior approval of Payson.

4. Selection of Environmental Projects. Payson shall establish a commission (the "Environmental Projects Commission") to make recommendations to Payson from time to time on Environmental Projects on which monies from the Environmental Portion should be spent. Payson shall invite American Rivers, the Sierra Club and the Nature Conservancy each to name one person to be a member of the Environmental Projects Commission. The size of the Environmental Projects Commission, its other members and its rules and procedures shall be as specified from time to time by Payson. After receipt of recommendations from the Environmental Projects Commission, Payson shall propose to the BOR the expenditure of monies from the Environmental Portion on Environmental Projects. In making such proposals, Payson shall describe in reasonable detail the Environmental Projects on which Payson proposes to spend monies from the Environmental Portion. The BOR shall review the Environmental Projects proposed by Payson, shall advise Payson if the BOR desires to consult with Payson on any Environmental Project proposed by Payson and, with respect to any proposed Environmental Project on which the BOR desires to consult, shall specify in reasonable detail any modifications to such proposed Environmental Project which the BOR considers beneficial to such project.

5. Preference for Riparian Creation, Enhancement and Preservation Projects. Payson and the BOR believe that projects which would create, enhance or preserve riparian habitats in the watershed in which Payson is located are likely to be projects which also would fulfill the Trust Fund Purposes. In proposing Environmental Projects to the BOR under Section 4 of this Memorandum, Payson shall give preference to proposed Environmental Projects which would create, enhance or preserve riparian habitats. In particular, Payson shall give preference to its Urban Riparian Wildlife Refuge Project, which is a project in the process of formulation by Payson and which Payson believes will result in the creation, enhancement or preservation of riparian habitats and which also will fulfill the Trust Fund Purposes.

6. Matching Funds. The BOR shall also endeavor to work cooperatively with Payson, as authorized by law, to provide funds for projects of mutual interest to both parties that

will assist in carrying out the goals and objectives of this Memorandum. In particular, but without limiting the generality of the foregoing, the BOR will assist Payson in dealing with the National Fish and Wildlife Foundation (the "Foundation") in an attempt to obtain funds under 16 U.S.C.A. § 3709 or any comparable legislation to match any expenditures of the Environmental Portion. To the extent permitted by law, any expenditures of the Environmental Portion shall be considered contributions to the Foundation in order to qualify such expenditures for such matching.

7. Termination. This Memorandum shall terminate on the date on which all of the Environmental Portion shall have been disbursed in accordance with this Memorandum.

8. Notices. All notices and communications hereunder shall be in writing and shall be deemed to be duly given if hand delivered or sent by (a) certified or registered mail, return receipt requested, or (b) by an overnight express mail or delivery service, at the addresses specified above or at such other address as any of the above may hereafter furnish in writing in the manner provided herein.

9. Counterparts. This Memorandum may be executed in duplicate originals, each of which shall constitute an original Memorandum.

10. Binding Effect. The provisions of this Memorandum shall inure to the benefit of, and shall be binding upon, the respective successors and assigns of the parties hereto.

11. Further Assurances. Each party agrees in good faith to execute such further or additional documents as may be necessary or appropriate to fully carry out the intent and purpose of this Memorandum.

12. Governing Law. This Memorandum shall be construed in accordance with applicable state and federal laws.

IN WITNESS WHEREOF, the parties hereto have executed the Memorandum on the day and year written below.

TOWN OF PAYSON, an Arizona
municipal corporation

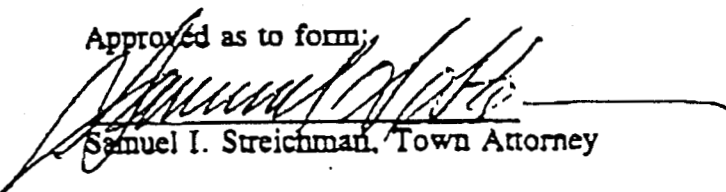
By: 
Craig Swartwood, Mayor

Date: 1-21-94

Attest:


Linda J. Foster, Town Clerk

Approved as to form:


Samuel I. Streichman, Town Attorney

01/27/94 14:47
TOWN OF PAYSON

602 258 2685
TEL:1-602-474-7052

LANDRY ASSOC.

Jan 27'94

10:48 No.003 P.05

UNITED STATES OF AMERICA

By: *David B. [Signature]*
Commissioner
Bureau of Reclamation

Date: 1/21/94

Legal Review and Approval

By: *William H. [Signature]*
Field Solicitor
Phoenix, Arizona

Date: 1/20/94

AGREEMENT AMONG THE TOWN OF PAYSON, SOUTHWEST COMMUNITY
RESOURCES, INC., THE CITY OF SCOTTSDALE,
THE CENTRAL ARIZONA WATER CONSERVATION DISTRICT AND
THE UNITED STATES FOR THE
EXCHANGE OF CENTRAL ARIZONA PROJECT WATER

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AGREEMENT

THIS AGREEMENT, dated as of _____, 1994, is entered into by, the Town of Payson, Southwest Community Resources, Inc., the City of Scottsdale, the Central Arizona Water Conservation District and the United States of America, acting through the Secretary of the Interior.

1.0 RECITALS

1.1 In 1968 the Arizona Congressional delegation provided a means for the water-short communities located in the upstream portions of the Salt and Verde River watersheds, to which water from the Central Arizona Project could not be directly delivered, to nonetheless benefit from the construction of the Central Arizona Project by providing the exchange language set forth in Section 304(d) of the Colorado River Basin Project Act of 1968, 43 U.S.C. § 1524(d).

1.2 In 1983 the Secretary of the Interior allocated to Payson 4,995 acre-feet of Central Arizona Project municipal and industrial ("M&I") water per year, 48 Fed. Reg. 12446, 12448 (Mar. 24, 1983).

1.3 In 1992 Payson, the United States, acting through the Secretary of the Interior, and the Central Arizona Water Conservation District entered into a Central Arizona Project ("CAP") water service subcontract for the delivery of 4,995 acre-feet of CAP M&I water per year, entitled "Subcontract Among the United States, the Central Arizona Water Conservation District, and the Town of Payson, Subcontract No. 2-07-30-W0281.

1.4 The East Verde River is the only surface water source available to Payson for an exchange of its Central Arizona Project water. In 1989 the United States Fish & Wildlife Service issued a

1 study of the environmental effects resulting from Payson's proposed
2 exchange of East Verde River water, Fish and Wildlife Coordination Act
3 Substantiating Report, Central Arizona Project, Verde and East Verde
4 River Water Diversions (December, 1989), and 1) concluded that
5 Payson's proposed exchange of East Verde River water would adversely
6 impact federally- and state-listed endangered and threatened species,
7 including the roundtail chub, as well as other native fish and
8 wildlife species, riparian vegetation and the East Verde River's
9 economically important put-and-take trout fishery; and 2) recommended
10 that any diversion of East Verde River water by Payson be limited to
11 an amount insufficient to exchange Payson's allocation of Central
12 Arizona Project water.

13 1.5 In 1984, W.S. Gookin & Associates conducted a study of
14 potential withdrawals from the East Verde River pursuant to an
15 exchange. Further study since 1984 has resulted in the conclusion
16 that an exchange involving East Verde River water is not legally,
17 physically or economically feasible, given 1) the legal restrictions
18 imposed by, inter alia, the Endangered Species Act, Section 404 of the
19 Clean Water Act and state law; 2) the inadequacy of East Verde River
20 surface flows and uncertainties concerning the future availability of
21 water imported into the East Verde River from Blue Ridge Reservoir;
22 and 3) the high cost of diverting, pumping, transmitting, storing and
23 treating East Verde River water, including all costs of construction
24 and environmental compliance.

25 1.6 Since passage of the Colorado River Basin Project Act in
26 1968, Payson has grown rapidly to a 1993 population of over eight
thousand residents. Payson's water supply, developed from multiple

1 wells tapping shallow groundwater in fractured granite beneath
2 Payson, is no longer adequate to meet the increasing needs of
3 Payson's residents, and Payson faces a severe water shortage crisis.

4 1.7 W.S. Gookin & Associates, engineering consultants for
5 Payson, have recommended that Payson begin to investigate and develop
6 alternative sources of water supply, including effluent reuse and
7 groundwater development. Preliminary review of such alternative water
8 sources indicates that feasible alternatives to a direct exchange of
9 East Verde River water do exist.

10 1.8 Payson has concluded that the development of an alternative
11 water source, such as an effluent reuse system and/or a new wellfield,
12 is preferable to attempting a direct exchange of its Central Arizona
13 Project water: not only is such a direct exchange cost prohibitive
14 and subject to the limitations of and claims under the Endangered
15 Species Act and other laws, but a direct exchange would also face
16 considerable opposition from sportsmen and environmental groups
17 opposed to further impairment of the fragile East Verde riparian
18 system. Such opposition could substantially harm Payson's recreation
19 and tourism industry and businesses dependent on visitation to the
20 Payson area.

21 1.9 Payson believes that it is entitled to water supply benefits
22 of the Central Arizona Project, as evidenced by the exchange
23 provisions in the Colorado River Basin Project Act. Payson is seeking
24 to assign the Payson Subcontract to Scottsdale in exchange for payment
25 by SCR to an irrevocable trust fund of funds to be used by Payson for
26 the exclusive purpose of developing an alternative water supply.

1.10 SCR is a private consulting corporation involved in the

1 planning, design, coordination and implementation of large-scale water
2 development projects. SCR has been involved for two years in
3 facilitating and doing feasibility analyses on alternative means for
4 Payson to use its Central Arizona Project allocation and to provide
5 water for Scottsdale and its residents through the assignment
6 described herein. SCR represents persons that desire water service
7 from Scottsdale and that are required to pay a water resource
8 development fee in order to obtain service. In the alternative and
9 with Scottsdale's approval, Central Arizona Project water may be
10 transferred to Scottsdale in order to obtain water service.

11 1.11 Scottsdale has limited water resources, which are
12 insufficient to provide a long term renewable water supply for all
13 future development within its water service area. To assist in
14 procuring additional water supplies, Scottsdale has imposed on new
15 developments a water resources development fee for the purpose of
16 acquiring and making available new water resources required to provide
17 an assured water supply for those new developments. Scottsdale's
18 water resource development fee ordinance provides that in lieu of
19 paying Scottsdale's water resources development fee or to receive a
20 refund of such fees previously paid, developers may, with the approval
21 of Scottsdale, transfer to Scottsdale the right to receive Central
22 Arizona Project water.

23 NOW, THEREFORE, in consideration of the premises and of the
24 promises and agreements hereinafter set forth, the parties hereto
25 agree as follows:

26 2.0 DEFINITIONS

This Agreement will employ abbreviated terms which will have

1 meanings as stated below.

2 2.1 "Amendment" shall mean the agreement among the United
3 States, CAWCD and Scottsdale in the form attached hereto as Exhibit
4 "C".

5 2.2 "Assignment" shall mean the agreement among Payson,
6 Scottsdale, CAWCD and the United States in the form attached hereto
7 as Exhibit "A".

8 2.3 "CAP" shall mean the Central Arizona Project, a reclamation
9 project constructed by the United States of America pursuant to the
10 Colorado River Basin Project Act, 43 U.S.C. §§ 1501 et seq.

11 2.4 "CAP Master Repayment Contract" shall mean the Contract
12 between the United States and CAWCD for Delivery of Water and
13 Repayment of Costs of the Central Arizona Project dated December 1,
14 1988 (Contract No. 14-06-W-245, Amendment No. 1).

15 2.5 "CAWCD" shall mean the Central Arizona Water Conservation
16 District, a water conservation district organized under the laws of
17 Arizona, with its principal place of business in Phoenix, Arizona.

18 2.6 "Contracting Officer" shall mean the Secretary of the
19 Interior of the United States or his duly authorized representative.

20 2.7 "Escrow Agreement" shall mean the agreement among Payson,
21 SCR and First American Title Insurance Company in the form attached
22 hereto as Exhibit "D".

23 2.8 "Payson" shall mean the Town of Payson, an Arizona municipal
24 corporation.

25 2.9 "Payson Subcontract" shall mean the Central Arizona Project
26 ("CAP") water service subcontract among the United States, CAWCD and
Payson, Subcontract No. 2-07-30-W0281.

1 2.10 "Scottsdale" shall mean the City of Scottsdale, an Arizona
2 municipal corporation.

3 2.11 "Scottsdale Subcontract" shall mean the Central Arizona
4 Project ("CAP") water service subcontract among the United States,
5 CAWCD and Scottsdale, Subcontract No. 5-07-30-W0063.

6 2.12 "SCR" shall mean Southwest Community Resources, Inc., an
7 Arizona corporation with its principal place of business in
8 Scottsdale, Arizona.

9 2.13 "Trust Agreement" shall mean the agreement among Payson and
10 the Trustee in the form attached hereto as Exhibit "B".

11 3.0 SUBSIDIARY AGREEMENTS

12 This Agreement includes as exhibits additional and subsidiary
13 documents in the form of assignments, contract amendments, escrow
14 instructions and trust agreements and all of which are attached hereto
15 and incorporated herein.

16 4.0 OBLIGATIONS OF PAYSON

17 4.1 Within thirty days of execution of this Agreement by all
18 parties, Payson shall execute the Assignment and the Escrow Agreement.

19 4.2 Within thirty days of execution of the Assignment by all
20 parties thereto, and of execution of Amendment No. 3 to the Scottsdale
21 Subcontract by all parties thereto, Payson shall execute the Trust
22 Agreement. Pursuant to the Trust Agreement, Payson shall cause to be
23 established an irrevocable trust fund whereby all monies deposited
24 into the trust fund from the escrow account established by SCR
25 pursuant to Paragraph 6.1 hereof may only be used for purposes of
26 defraying the expenses associated with investigating, planning,
designing, constructing, acquiring and/or developing an alternative

1 water supply to replace the CAP water assigned by Payson pursuant to
2 this Agreement, up to a combined net increase in Payson's water system
3 capacity of 4,995 acre-feet per year. Expenditures of trust fund
4 monies may include, inter alia, expenses associated with the
5 acquisition of any interests in land or water required for such an
6 alternative water supply. In developing an alternative water supply
7 with monies released pursuant to the Trust Agreement, Payson shall
8 comply with all applicable laws including, inter alia, state water and
9 environmental laws; provided, however, That the parties hereto
10 expressly agree that the expenditure of trust fund monies shall not
11 constitute an expenditure of federal funds, exercise of federal
12 authority, or other form of federal action affecting the environment.

13 4.3 Any monies held in trust pursuant to the Trust Agreement
14 which are in excess of the amount required to satisfy the purpose set
15 forth in Paragraph 4.2 hereof shall be released to CAWCD to be applied
16 towards its repayment obligation under the CAP Master Repayment
17 Contract. Further, any monies held in trust pursuant to the Trust
18 Agreement which have not been committed or expended by Payson at the
19 end of twenty-five years from the effective date hereof shall be
20 released to CAWCD to be applied towards its repayment obligation under
21 the CAP Master Repayment Contract.

22 4.4 Payson indemnifies and holds harmless Scottsdale, SCR, the
23 United States and CAWCD for any liabilities resulting from or relating
24 to Payson's use and expenditure of monies released to Payson pursuant
25 to the Trust Agreement.

26 5.0 OBLIGATIONS OF SCOTTSDALE

5.1 Within thirty days of the execution of this Agreement by

1 all parties, Scottsdale shall execute the Assignment and the Amendment
2 whereby the Scottsdale Subcontract will be amended to increase
3 Scottsdale's CAP entitlement thereunder by 4,995 acre-feet per year,
4 as provided in the Amendment. Upon execution of the Amendment by all
5 parties thereto, Scottsdale shall file and prosecute in a court of
6 competent jurisdiction an action for validation of the Amendment.

7 5.2 Scottsdale shall accept the rights to CAP water assigned by
8 Payson in lieu of payment of the water resource development fees by
9 those persons or entities designated by SCR, to the extent allowed by
10 Scottsdale Revised Code § 49-74.1. Where persons or entities
11 designated by SCR qualify for a refund of water resource development
12 fees based on the assignment of Payson's CAP entitlement to
13 Scottsdale, Scottsdale shall refund the fees. Such refunds shall be
14 made by Scottsdale and delivered as directed by SCR and by the persons
15 or entities designated by SCR and entitled to the refunds within two
16 business days after receiving an order from a court of competent
17 jurisdiction validating the Amendment.

18 5.3 Scottsdale indemnifies and holds harmless Payson, SCR,
19 CAWCD and the United States for any liabilities resulting from or
20 relating to Scottsdale's obligations under its amended CAP subcontract
21 or the use of water obtained therefrom.

22 6.0 OBLIGATIONS OF SCR

23 6.1 Within thirty days of the execution of this Agreement by
24 all parties, SCR shall execute the Escrow Agreement and thereby
25 deposit or cause to be deposited in the escrow account the sum of
26 \$5,394,600.00 as provided in the Escrow Agreement; provided, however,
that up to \$4,394,600.00 of this sum may be in the form of Letters of

1 Commitment and Letters of Instruction. Upon the occurrence of the
2 conditions stated in Paragraph 5 of the Escrow Agreement, the escrow
3 agent shall release funds held in escrow as follows:

4 a. \$4,318,796.00, plus all interest accruing on the funds
5 held in Escrow, to the Trustee under the Trust Agreement for deposit
6 into Payson's trust fund established by the Trust Agreement; and

7 b. \$1,075,804.00 to CAWCD for payment of charges in lieu
8 of ad valorem taxes imposed under the Payson subcontract.

9 7.0 OBLIGATIONS OF CAWCD AND THE UNITED STATES

10 The United States and CAWCD shall, within thirty days of
11 execution of this Agreement by all parties hereto, execute the
12 Amendment and the Assignment.

13 8.0 EFFECTIVE DATES

14 8.1 This Agreement shall be binding and effective against the
15 parties hereto only upon the execution of the Agreement by all of the
16 parties hereto.

17 8.2 Neither the Assignment nor the Amendment shall be effective
18 until the Amendment has been validated by a court of competent
19 jurisdiction. Provided, however, That for purposes of entitlement to
20 CAP water and payment of water service charges under the Payson
21 subcontract, the Assignment and the Amendment shall be deemed
22 effective upon execution by all parties thereto. Provided, further,
23 That CAWCD shall defer collection of the equivalency charge pursuant
24 to Subarticle 5.2(c) of the Payson subcontract until the date on which
25 the Amendment is validated.

26 8.3 If a court of competent jurisdiction denies validation of
the Amendment and no further appeal is possible, the rights and

1 obligations of the parties pursuant to this Agreement shall be null
2 and void, the Assignment and the Amendment described herein shall be
3 of no further force or validity, any acceptance in lieu of fees
4 pursuant to Paragraph 5.2 hereof shall be of no force or validity, and
5 any monies placed in escrow pursuant to Paragraph 6 hereof shall be
6 returned to the transferors of such monies.

7 9. MISCELLANEOUS

8 9.1 To the extent Section 38-511, Arizona Revised Statutes, is
9 applicable to this Agreement, Scottsdale and Payson hereby represent
10 that the persons significantly involved in the initiating,
11 negotiating, securing, drafting and creating of this Agreement on
12 behalf of Scottsdale are Leonard Dueker and Barbara R. Goldberg and
13 on behalf of Payson are Colin Walker, Bruce Babbitt, David J. Bodney
14 and Steven M. Hoffman, and SCR hereby represents that none of the
15 above-listed persons is or has been, as of the date of execution
16 hereof, an employee or agent of or consultant to SCR. SCR also hereby
17 covenants to not employ any of the above-listed persons as an
18 employee, agent or consultant for a term of at least three years
19 following the execution hereof.

20 9.2 The headings of this Agreement are for reference only and
21 shall not limit or define the meaning of any provision of this
22 Agreement.

23 9.3 This Agreement may be executed in duplicate originals, each
24 of which shall constitute an original Agreement.

25 9.4 The provisions of this Agreement shall inure to the benefit
26 of, and shall be binding upon, the respective successors and assigns
of the parties hereto.

1 9.5 Each party agrees in good faith to execute such further or
2 additional documents as may be necessary or appropriate to fully carry
3 out the intent and purpose of this Agreement.

4 9.6 This Agreement shall be construed in accordance with all
5 applicable laws of the State of Arizona.

6 9.7 This Agreement constitutes the entire agreement between the
7 parties and no understandings or obligations not herein expressly set
8 forth shall be binding upon them. This Agreement may not be modified
9 or amended in any manner unless in writing and signed by all of the
10 parties hereto.

11 IN WITNESS WHEREOF, the parties hereto have executed the
12 Agreement herein on the day and year written below.

13 TOWN OF PAYSON, an Arizona
14 municipal corporation

Attest:

15 By: _____
16 Craig Swartwood, Mayor

Linda J. Foster, Town Clerk

17 Date: _____
18

Approved as to form:

Samuel I. Streichman
Town Attorney

19
20
21
22 SOUTHWEST COMMUNITY RESOURCES,
23 INC., an Arizona corporation

24 By: _____
25 Timothy R. Bray, President

26 Date: _____

4

JOHN S. SUMNER

728 N Sawtelle
Tucson, AZ 85716
May 26, 1978

Mr. E. R. Ralls
E and R Water Company
260 N Miller
Mesa, AZ 85203

Dear Mr. Ralls:

Enclosed herewith are two copies of the report by Mr. Gary Hix titled "A Hydrogeologic Investigation of the Pine-Strawberry Area, Arizona." I have reviewed this report and the field investigation method in some detail, and I concur with the recommendations.

In some ways this geologic study is only an initial phase of a total hydrogeologic development plan. The next phases suggested in order of priority are:

1. A more thorough development of existing wells.
2. A careful drilling of new wells.
3. A continuing study of water levels of existing and new wells.
4. Geophysical studies to locate and help develop new sources of water.

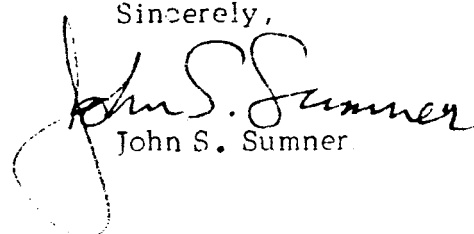
The Hix report is fairly specific except for geophysical exploration aspects. The methods that we suggest would be a subsurface temperature study made in the region and a local gravity survey. While there is no promise that these methods will find more water, I believe there is an even chance of success. Thus, I recommend that this work be undertaken.

If you wish, I would be willing to direct another student for the coming school year to do this geophysical survey work. My cost estimate would be about \$4,000 for the work, which would include a quarter-time graduate research assistantship, field expenses, and computer time.

A concluding invoice for the geologic study is enclosed. You will note that the total cost of this work to you was considerably under my estimate of a year ago. I trust that you will find these results worthwhile.

With best regards,

Sincerely,


John S. Sumner

Encl:

P.S. I am also returning the Huggins report and your maps—JSS

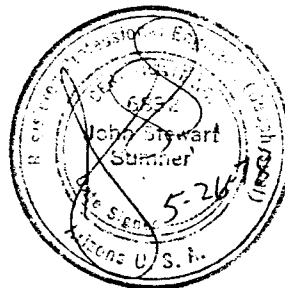
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PW 0001-000049

A HYDROGEOLOGIC INVESTIGATION OF THE
PINE-STRAWBERRY AREA, ARIZONA

Prepared for the
E & R Water Company
Mesa, Arizona

by
Gary L. Hix
under the supervision
of
John S. Sumner



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SUMMARY

The amount of surface water from springs in the Pine and Strawberry area is inadequate for domestic purposes for the area. Ground-water sources currently being used have also yielded an insufficient water supply, but there has been no systematic study of the amount of water that may ultimately be developed. This report reviews the geology of the region and water-table data as a first step in the search for additional water. Investigation revealed that there are not sufficient data available to make an evaluation of the aquifers.

Formations present in the area vary from impervious quartzite and cavernous limestones to porous alluvium. The cavernous limestones may be responsible for much of the complexity of the subsurface flow. The subsurface topography of the impervious Precambrian Mazatzal Quartzite appears to control the subsurface flow regime.

It appears that presently existing wells could be developed as more reliable water sources. These wells should also be studied by pump tests and water-level measurements to improve knowledge of existing water resources. A more completely developed piezometric surface (water-level) map would help explain the subsurface flow pattern.

Geophysical measurements such as gravity and ground-water temperature measurements would be helpful in interpreting ground-water flow and may aid in locating new wells.

INTRODUCTION

This hydrogeologic study was begun in October 1977 at the request of Mr. E. R. Ralls, president of E & R Water Company. The purpose of the study was to investigate the Pine-Strawberry area, Arizona, which is served by the E & R Water Company, and to advise the company on the hydrologic factors that relate to the search for additional water supplies.

The investigation began with the gathering of information concerning the area, including theses and dissertations by hydrology and geology students. A search was made of the State Land Department records for logs of well that have already been drilled. A reconnaissance hydrogeologic map (Plate 1, in pocket) was made to determine the geologic controls present. This map is not intended to be a detailed geologic map of the area but is intended to bring out the salient features that control the ground water. A survey of the wells that are owned and operated by the E & R Water Company was made to determine water tables and to evaluate the production capabilities of the aquifers. A review of previous geologic investigations was made as well as communication with persons familiar with the area and water well drilling techniques.

This report concludes with recommendations for the company for locations that may be the most favorable for drilling of wells.

Location

The area of the present study lies just south of the Mogollon Rim in north-central Arizona in the northern portion of Gila County (Fig. 1).

Topographic relief is considerable (Fig. 2). The northern portion of the area is a plateau that lies mostly above 6,500 feet ASL and rises as high as 7,000 feet ASL. The terrain drops sharply at the rim to 6,000 feet and slopes steeply downward to 5,400 feet in Pine Valley. The Mogollon Rim has a strong influence on the hydrologic nature of the area.

Most of the region is heavily forested with pine trees, oak woodlands, and manzanita brush. Only the cliffs of the rim are well exposed. Adequate rainfall for ground-water recharge usually prevails in the region annually. In July and August summer showers drop several inches of rain in a relatively short period. Most of this water is lost to surface runoff. During the winter snow falls on the upper portions of the rim and rain generally falls in the valley. Much of this water goes into ground-water recharge. The summer climate is usually quite pleasant, which makes the area very desirable for summer home sites.

Fluctuations in the population from winter to summer are a factor the water company must consider in planning water well production and distribution systems. Further development of the area is contingent on locating a water supply adequate to provide the population with water throughout the year.

Previous Investigations

One of the earliest investigations of the area and the geologic units involved was done by Darton (1910), who described and named the Supai formations at the type locality in Havasu Canyon in the Grand Canyon. The proper name for this unit is now Supai Group (McKee, 1976). Recent investigations of the Supai formations include work by McKee

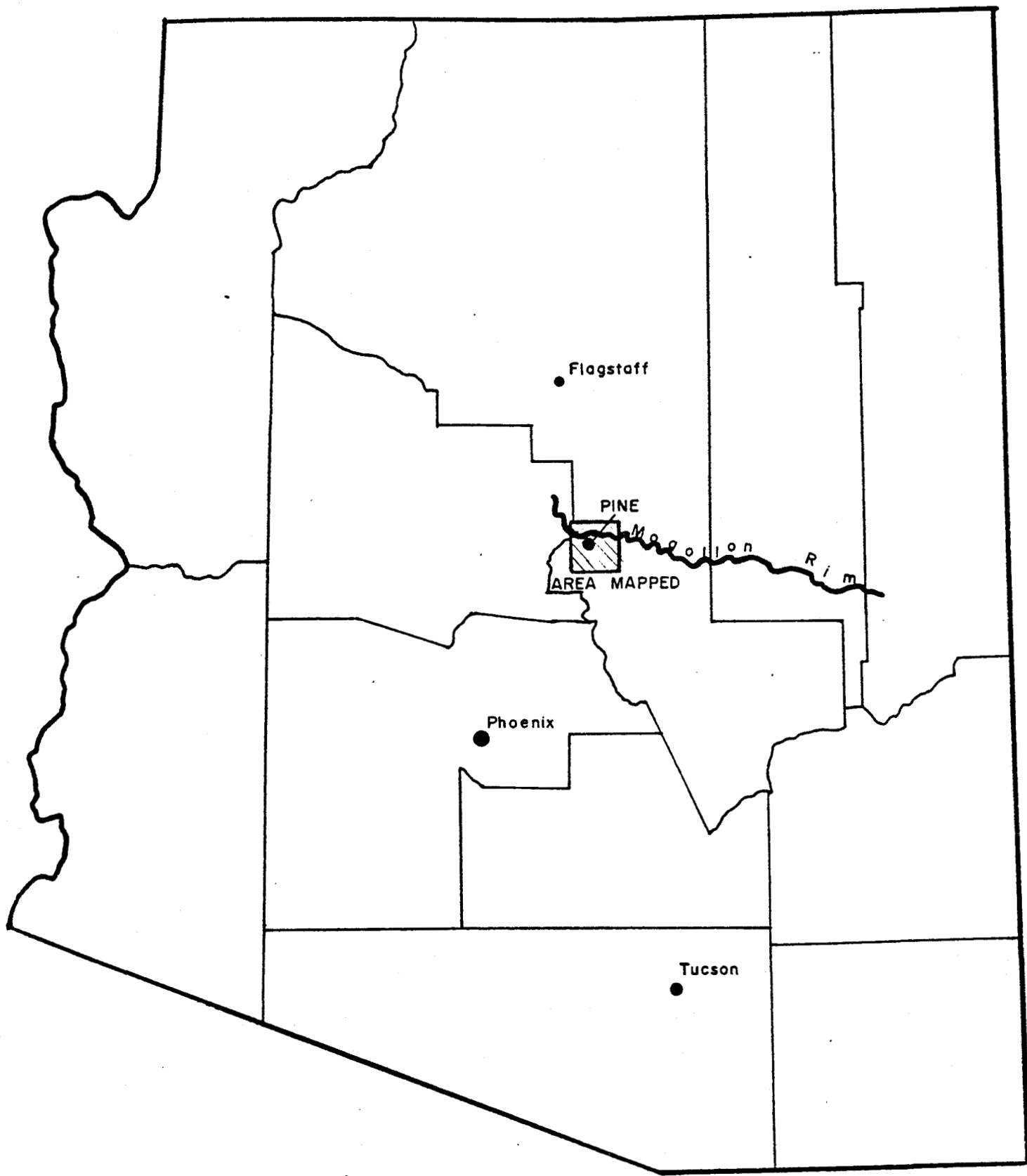


Figure 1. Location of the Pine-Strawberry area

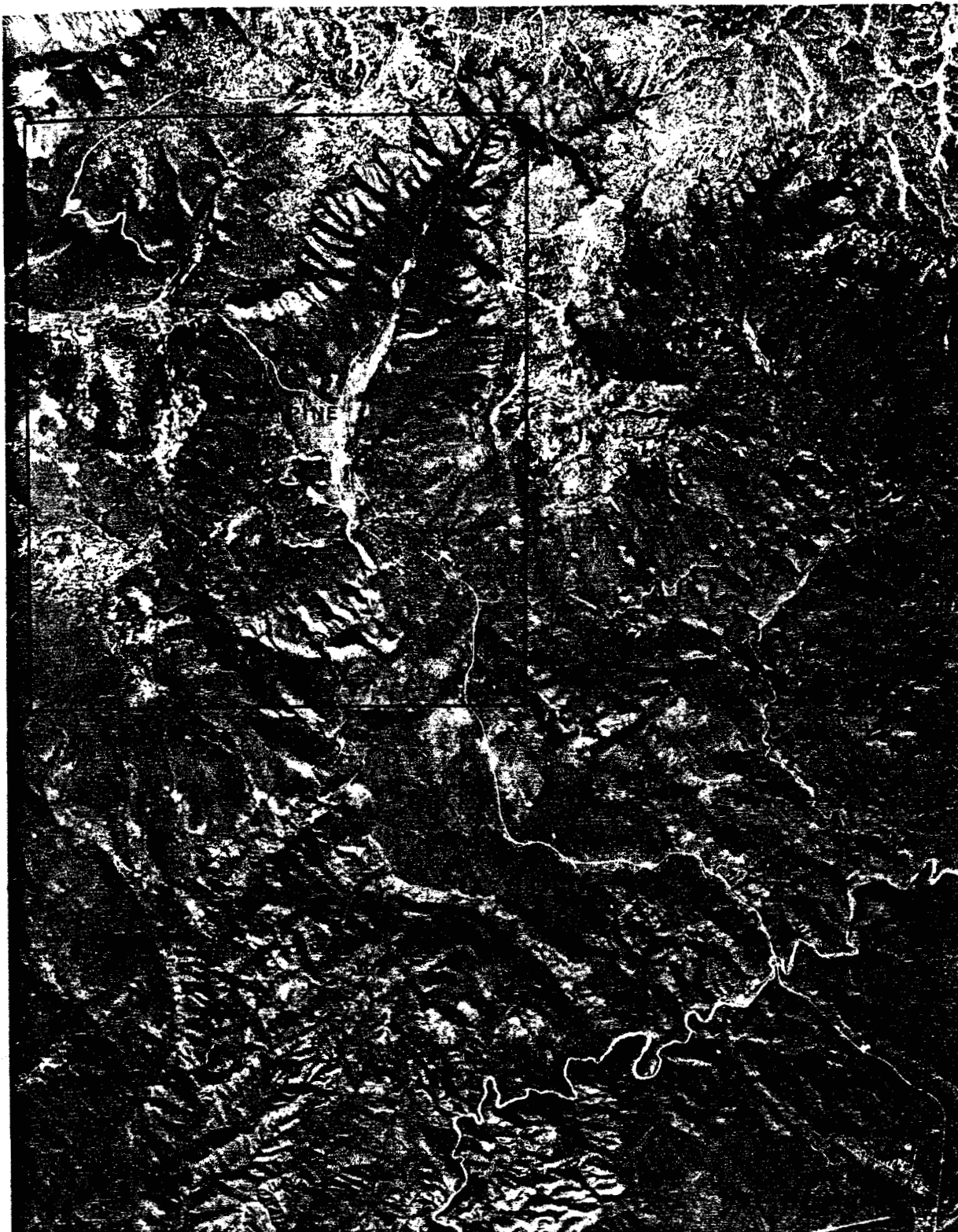


Figure 2. Aerial photograph of the Pine-Payson area showing the area of investigation

NASA U-2 aerial photography, mission 155, roll 19, frame 744; flight altitude 65,000 feet, scale 1" = 2 miles, March 1973. Snow can be seen on the mesas and north side of hills.

(1945), Jackson (1951), Frazier (1961), Gerrard (1964), Passmore (1969), and Conyers (1975). Most of these investigations are of a geologic nature and are not primarily concerned with hydrologic problems. Previous studies also include a report by Earl Huggins, with a geologic map by George Billingsly, prepared at the request of Mr. E. R. Ralls of the E & R Water Company. A number of wells were drilled as a result of this investigation and these will be discussed later. The Arizona Water Commission, in cooperation with the U.S. Geological Survey, is currently conducting a study of the Pine-Payson-Kohl's Ranch area to obtain geologic and hydrologic data for the surrounding area. Water-table levels and well depths of some wells in the preliminary report (Arizona Water Commission, 1977) were used in compiling the water-table level summary (Appendix A).

Hydrologic investigations of the area include a U.S. Geologic Survey open file report by Feth (1954), "A Preliminary Report of Investigations of Springs in the Mogollon Rim Region," and Feth's (1963) later report in the U.S. Geological Survey Water-Supply Paper 1619-H. There are also annual reports of surface-water data made by the U.S. Geological Survey in "Water Resources Data for Arizona."

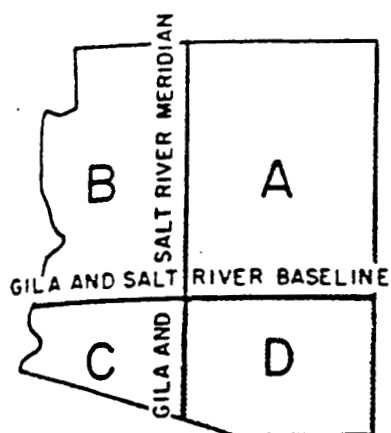
The Arizona State Land Department in Phoenix maintains records of water wells drilled in the state. These records can be useful in making a survey of wells within a particular area. One of the requirements for obtaining a permit to drill a well in the state of Arizona is a report of certain data for the drilled well: the date the well was drilled, name of driller, method of drilling, total depth of well, well diameter, and depth to water. Well design information, such as the diameter of the well

casing and the type and depth to openings, are often reported by the drillers. A description of the units penetrated is also required, but the descriptions furnished by drillers often include such catch-all phrases as "junk rock," "trap rock," and "black dirt," Such descriptions cannot be reliably used as geologic rock-type descriptions. Estimations of gallons per minute of water produced by the well as reported by drillers are often misleading due to the methods of measurement used.

The Arizona State Land Department records were used in this investigation to compile information of well locations and their relative production capacity, and more importantly, where dry or unsuitable wells were drilled.

Well Numbering System

To relate all water-well information to the same base map, a numbering designation system was used throughout that conforms to standard accepted procedures of letters and numbers that locate each well within a 10-acre parcel anywhere within the state of Arizona. The numbers assigned to each well conforms to the abbreviated location system used by the U.S. Geological Survey and the Arizona Water Commission and is based on the U.S. Bureau of Land Management's system of land subdivision. The state of Arizona is divided into four quadrants (Fig. 3a), centered on the Gila and Salt River Base Meridian. The quadrants are lettered counterclockwise with capital letters A, B, C, and D. All wells within the area of interest are with the A quadrant and their designation begins with this letter. Following the letter for the quadrant are the numbers for the township and range separated by a hyphen and set within



(a)

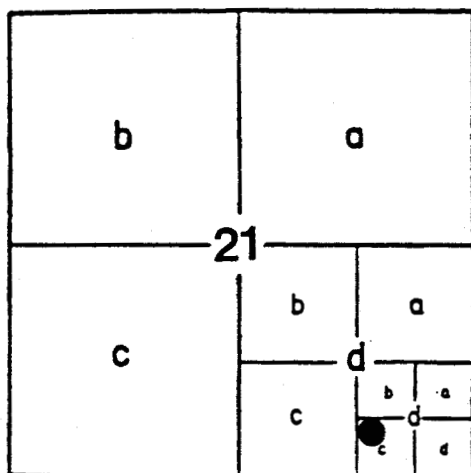
	R 3E	R 4E	R 5E	R 6E	R 7E	R 8E
T 13N						
T 12N						
T 11N						
T 10N						
T 9N						
T 8N						

Township and range system

(b)

Sample well

● A(12-8)
(21-1)
ddc



Section 21

(d)

	R. 8 E.					
	6	5	4	3	2	1
T. 12 N.	7	8	9	10	11	12
	18	17	16	15	14	13
	19	20	21	22	23	24
	30	29	28	27	26	25
	31	32	33	34	35	36

section number system

(c)

Figure 3. Well numbering system

parentheses. On the line below is the number of the section in which the well is situated and the number of the well, if there is more than one in the section, again separated by a hyphen and enclosed in parentheses. On the third line appears the location of the well site within the section described by small letters (Fig. 3d) assigned in a counterclockwise direction beginning in the northeast quadrant of the section.

The description of one of two wells located in the SW1/4SE1/4 SE1/4 sec. 21, T. 12 N., R. 8 E. would appear as:

A(12-8)
(21-2)
ddc

or

. A(12-8)(21-2)ddc

GEOLOGY

The following description of the geology of the Pine-Strawberry area will also include a discussion of the hydrologic characteristics of the individual formations present. Figure 4 is a geologic section of the formations.

Alluvium

The youngest geologic unit found with the area of this investigation is recent alluvium. Although alluvium deposits are commonly very good aquifers, none was found that had sufficient areal extent or adequate thickness to be a major hydrologic target. Locally, the alluvium consists of debris of assorted sandstones, limestones, mudstones, shales, and basalts. Alluvium is generally found along the streams of pine and Oak Creeks.

Basalt

Basalt flows cap a large portion of the Mogollon Rim and can be seen forming the topmost unit along the rim and lower mesas within the area mapped. These flows have been dated as Tertiary and Quaternary by Wilson (1959) on his geologic map of Gila County and by most subsequent investigators.

Milk Ranch Point Mesa is capped by basalt. Basalt covers the Coconino Sandstone in the north part of the mesa and the Supai Group in the south (Plate 1; Fig. 5). A similar capping of basalt overlying the Supai formations can be seen in photographs of Strawberry Mountain

Tertiary

Permian

Permian

Permian

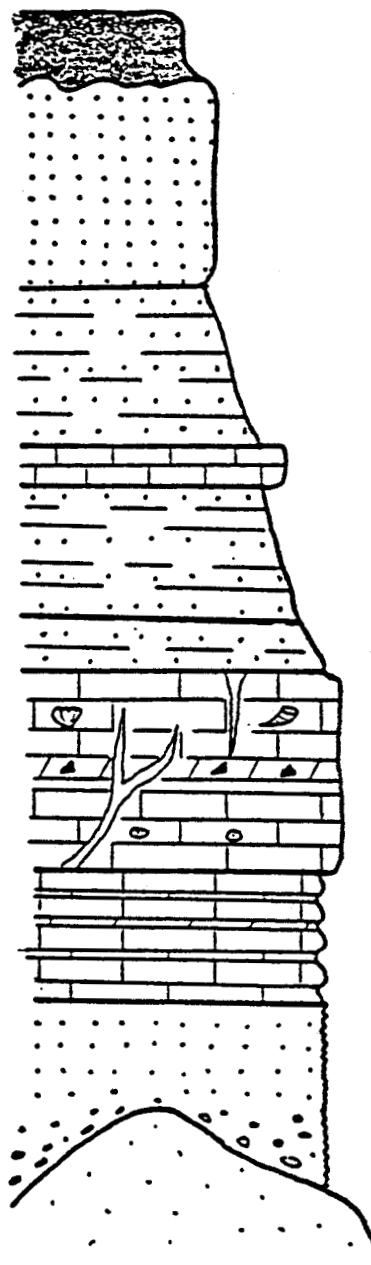
Permian-
Pennsylvanian

Mississippian

Devonian

Cambrian

Precambrian



Basalt

Coconino
SandstoneUpper
Supai Group

Fort Apache Limestone

Lower
Supai Group

Naco Formation

Redwall Limestone

Martin Formation

Tapeats Sandstone

Mazatzal Quartzite

Figure 4. Geologic section of formations present in the Pine-Strawberry area. Drawing not to scale.

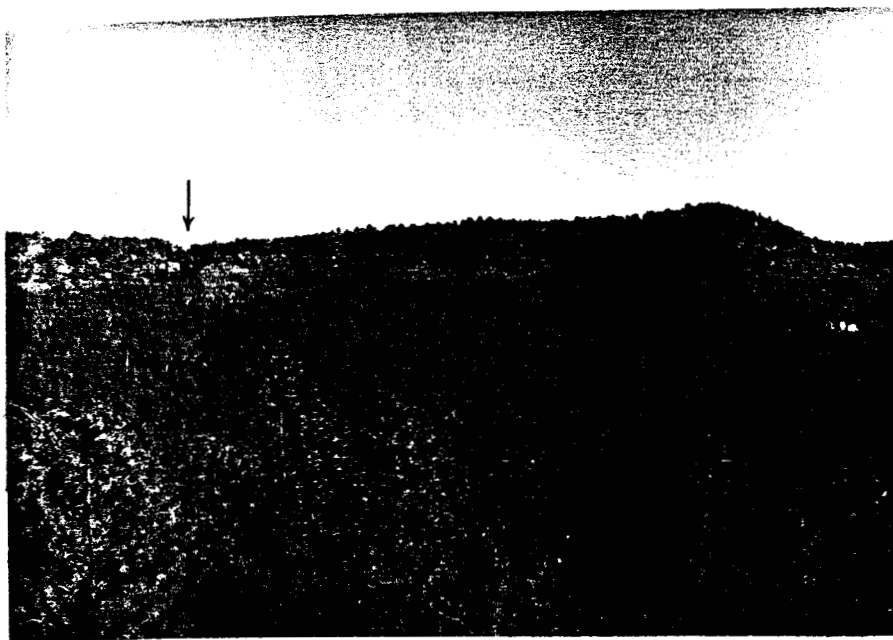


Figure 5. Milk Ranch Point Mesa looking east from Pine

Arrow indicates contact between Coconino Sandstone (left) and the basalt (right), which caps the Supai Group.

(Fig. 6). On both mesas, the basalt was found to be progressively thinner toward the south.

During the mapping, a thin veneer of basalt was found in contact with the much older Cambrian Tapeats Sandstone in the area of Oak Springs Canyon. The Hardscrabble Mesa southwest of Oak Springs appears to be a basalt capping several hundred feet thick with considerable areal extent.

Basalts may form good aquifers due to fracturing within the unit, and the water has lower mineral concentrations than that found in other rock units. No evidence of any wells drilled in the basalts was found in the records. This potential aquifer remains untested locally, but would probably be perched with uncertain reliability.

Coconino Sandstone

Coconino Sandstone forms the major portion of the Mogollon's Rim's upper sections. The spectacular cliffs of Coconino Sandstone on the rim can be observed from almost anywhere in the area. The formation is considered to be of Permian age (Darton, 1910), and it covers a large portion of the Colorado Plateau. It is described as a quartz arenite, light brown to tan, clean, fine to medium quartz sand grains, well rounded and well sorted, with cross laminated trough wedges. The formation is friable and highly fractured in most areas (Fig. 7). The unit ranges from over a thousand feet thick within the Colorado Plateau to less than one hundred feet thick on the northern portion of Strawberry Mountain. The Coconino Sandstone lies conformably upon the Supai Group. For this study, the contact between them was placed at the base



Figure 6. Strawberry Mountain looking west from Highway 87 and Pine Canyon Road junction

Basalt caps the Supai Group.

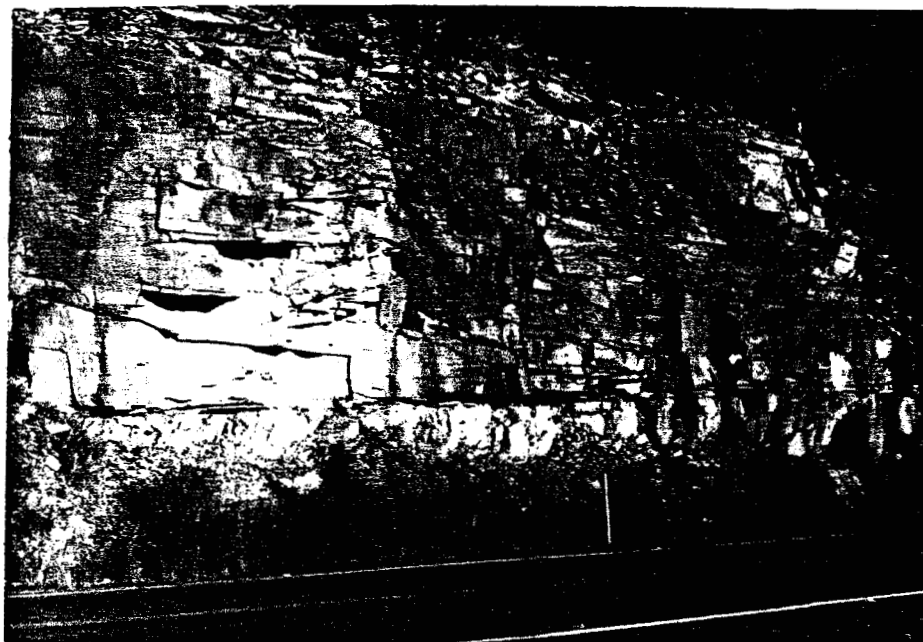


Figure 7. Coconino Sandstone exposed along Highway 87 above the town of Strawberry, Arizona

of the last cliff-forming, light-brown, clean sandstone bed and the beginning of the slope-forming, reddish, silty sandstone and siltstone beds. This is more a hydrologic than a geologic classification.

Locally, the Coconino is friable and poorly cemented and is known to be slightly permeable. Huntoon (1970) reported the permeability as 1 gal/day/ft². This is a laboratory measurement made from samples and not a measure of the in situ capability of the unit as an aquifer. Fracturing along bedding planes and jointing account for a much higher permeability for the unit as a whole (Fig. 7). Ground water can move freely downward through the Coconino until it reaches the less permeable Supai formations below.

Recharge of the Coconino aquifer through rain and snow melt on the Colorado Plateau would classify the unit as a target for ground water anywhere north of the rim. Proved wells of good-quality water are known to exist on the plateau. Water from the Coconino Sandstone along the rim is reported to be low in dissolved solids and is of good quality near the rim but increases in mineral content as it moves down-dip to the north (Feth, 1963).

Supai Group

The Supai Group was first named by Darton (1910) for the type locality in Havasu Canyon. It has been dated by its fossils as Permian and Pennsylvanian. For the purpose of this report, the Supai is considered to be a red-bed unit of Permian age and includes the Fort Apache Limestone member as well as the Pennsylvanian-Permian Naco Limestone. The Fort Apache Limestone is considered by this writer to be of

notable importance in controlling subsurface water within the area of interest. Considerable time was spent traversing and sampling this formation. This unit will be discussed separately.

Locally, the Supai Group varies from the type section in the Grand Canyon sufficiently to warrant reinvestigation as an aquifer. The group is predominantly composed of reddish to reddish-brown and orange-brown sandstones, siltstones, mudstones, and shales. A number of different limestone and dolomite beds are present. Thicknesses range from 1,000 to 2,000 feet nearby in the Grand Canyon. Jackson (1951), Frazier (1964), and others have described the geology of the various beds within the area.

The Supai Group forms most of the slopes beneath the Coconino Sandstone cliffs. Due to the high silt content, the unit is an unstable slope former as shown by the large number of slump blocks that have slid down into the valley around Pine. The structural nature of the formation also accounts for the poor quality of the unit as an aquifer. Huntoon (1970) reports a permeability of 0.0001 gal/day/ft². Again, this is a laboratory measurement of a sample and not a measure of the formation as a whole. The relative permeabilities of the Supai and Coconino, 0.0001 and 1.0, respectively, are probably representative of the relationship between the formations. An exception would be the permeability of the Fort Apache Limestone member of the Supai Group.

Most water wells in the Pine and Strawberry area begin in and penetrate most or all of the Supai formations, but neither the upper or lower Supai formation is considered as good an aquifer as the Coconino Sandstone.

Fort Apache Limestone

The Fort Apache Limestone was originally named by Stoyanow (1936) for the limestone type section at Kelly Butte on the Fort Apache Indian Reservation. The member is distinguished as a light gray dolomitic limestone that forms a small cliff across most of the slopes above Pine except where vegetation or slump faulting has covered it. An excellent exposure can be seen cutting through Strawberry Mountain (Fig. 8).

One of the first extensive studies of the Fort Apache Limestone was done by Frazier (1961), who assigned a Wolfcampian or Leonardian age to the unit. He placed it approximately 550 feet below the top of the Supai Group in the area around Pine. Here the measured thickness is 29 feet, and he describes the formation as limestone, shales, and siltstones with intervening Supai-type red beds. Gerrard (1964) reported the unit to be 49 feet thick on Strawberry Mountain, 1.5 miles northwest of Pine, and predominantly limestone (Fig. 8).

Samples were taken during the current investigation; their locations are noted on Plate 1. The samples vary from gray, hard, dolomitic limestone to a white, soft, highly clacareous, limy siltstone with numerous solution cavities and channels. Deposits of calcium carbonate form where ground water has been channeled to the surface and has evaporated. The writer believes that the Fort Apache Limestone collects what ground water reaches the Supai formations and channels it through the more pervious zones. The soluble nature of the formation in various zones apparently result in the collection of water between the less permeable Supai beds above and below. Small springs and seeps form from these zones. Numerous strike and dip measurements were taken around

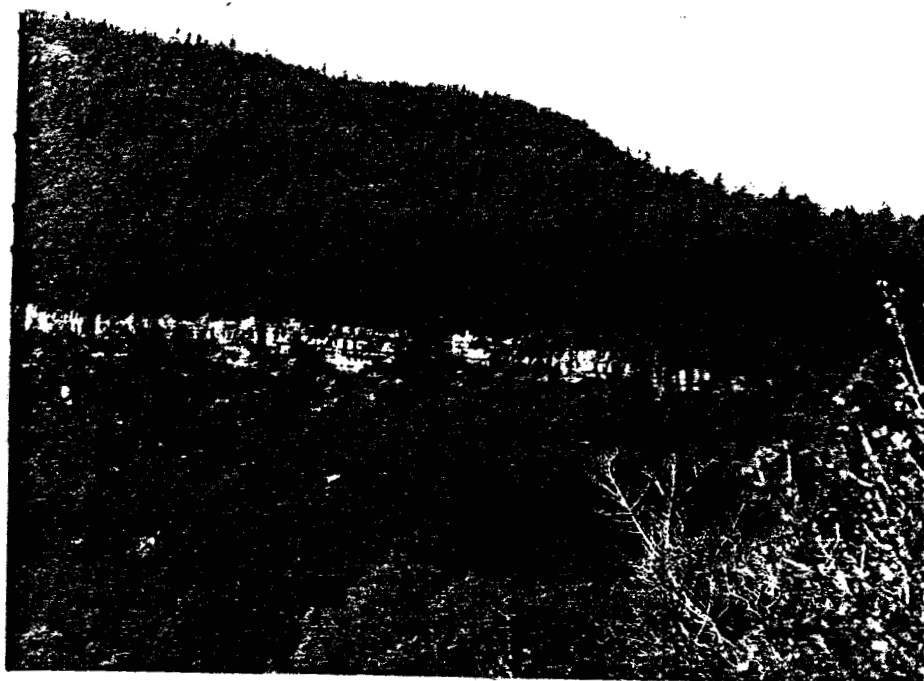


Figure 8. Fort Apache Limestone member on Strawberry Mountain seen from Highway 87 looking west.

the valley where the limestone member could be found. These measurements indicate a generally north to northeast trend in the Pine Valley and a north to northwest trend in the Strawberry area.

An example of a spring where water is migrating downdip through a fractured zone within the limestone was found in Pine Canyon about halfway between Camp Lo Mia and Parsnip Spring (Plate 1). This spring is along the west wall of the canyon about 10 feet above Pine Creek. Discharge at the time it was observed was estimated to be between 10 and 15 gal/min. A travertine build-up 5 feet wide and more than 10 feet tall has formed a hollow column where water could be observed seeping from the limestone formation. The unit could be traced along the stream bottom for over 200 feet. Along the east wall of the canyon it disappears beneath talus and vegetation. The writer believes that before erosion the formation was continuous across Pine Canyon. This is based on observed outcrops to the south and measured distances to the base of the overlying Coconino Sandstone (Fig. 9).

Parsnip Spring is approximately half a mile upstream from the unnamed spring. Parsnip Spring issues from near the base of the Coconino Sandstone and the top of the Supai Group siltstones. The spring was estimated to be flowing at a rate of 15-20 gal/min. The water observed being discharged here is attributed to ground water in a perched water table within the Coconino Sandstone and not to a water table within the Supai formations.

Other samples and observations of the Fort Apache Limestone include those taken at Fuller Spring in the area of the pass between Pine and Strawberry (Fig. 10). Here the member is silty, friable, and easily



Figure 9. Exposure of Fort Apache Limestone on Milk Ranch Point Mesa



Figure 10. Fort Apache Limestone at Fuller Spring

broken. Downstream there is evidence of an an eroded slump block that was once at the same elevation as the spring.

Investigation of these and other springs located on the slopes around the valley indicate that there has been sufficient quantities of water at these points in the past to have caused the numerous slump faults that have occurred around the valley. During periods of abundant rainfall and ground-water recharge the ground around these springs was probably saturated to a point where it could not longer support the block. In almost every place where such blocks were observed the limestone in the slopes above the slump was found to be softer and more silty than in other sections. Springs or seeps accompanied by increased vegetation were usually found upslope from the slumped areas.

The significance of this limestone unit as a hydrologic control in the area is that it can be considered a collector and channeler of what little water penetrates the formations above it. Any water wells drilled into this unit in a zone where subsurface water is being concentrated has the possibility of producing more water than could be found elsewhere in the Supai; therefore, favorable areas for ground water may be found in the upper reaches of either Pine or Strawberry Canyons or in the area known as "the cove" south of Strawberry (Plate 1). It should be noted here that a land ownership study was not undertaken as a part of this study and desirable targets for ground-water potential are described without regard to land ownership.

Naco Formation

For the purposes of this investigation, the Naco Formation has been mapped as part of the Supai Group. Across the state the Naco crosses geologic time lines as distinct mappable units. Where hydrologic considerations are of primary concern, geologic boundaries are not important, because the Naco Formation is not considered a good aquifer.

Redwall Limestone

The Redwall Limestone of Early Mississippian age was described by Gilbert (1875) and is named for the bright-red color of the type section commonly observed in the Grand Canyon. However, the true color of the Redwall is gray, the name coming from the color imparted to it by the overlying Supai Group.

This basically limestone formation is set aside as a separate hydrologic unit on the basis of its nature to be cavernous and a host unit for some of the larger springs in the Mogollon Rim area (Feth, 1954). The capacity of this formation to conduct ground water is not related to its permeability or porosity but to solution channels formed along fractures and faults. An unconformity, which represents a considerable amount of time and which formed karst topography, is present between the Redwall Limestone and the overlying Supai Group. There is also an autobrecciated bed within the Redwall Formation of limestone with chert fragments in a dark red-purple claystone matrix.

The Redwall forms a series of sheer escarpments in the Grand Canyon area but locally forms the Pine Valley floor south of the town.

Exposures can be seen along the highway leading into Pine from Payson. One excellent exposure of the Mississippian Redwall can be seen at the junction of Highway 87 and the Control Road turn off, approximately two miles south of Pine (Fig. 11). The Redwall Limestone has been draped over the much older Mazatzal quartzite at this locality. The hydrologic significance of this contact is that it indicates that the quartzite was a topographic high at the time of deposition of the Redwall. Numerous strike and dip measurements were taken at points along the contact between the Redwall and the quartzite that show the draping effect.

An open fracture and solution channel can be seen just south of Pine along the east side of Highway 87. A crevice about 18 inches wide and dipping steeply downward to the north can be found along the north bank of the stream (Fig. 12). One mile north and slightly west of this entrance, a dry water well was observed. This well is reported to be 910 feet deep. An unsuccessful attempt was made to sound this well. Over 400 feet of wire did not reach water. This writer observed and noted the well to be blowing air with a definite musty, damp smell. This well may have intercepted a branch of a fracture in the Redwall.

There have been reports of water wells within the Pine area that have been lost when dynamite was used to loosen the rock. This is what would be expected of a formation in which the water was controlled by solution channels rather than a consistent permeability. Aquifers of this type are generally unreliable producers and are subject to contamination and seasonal variations in rainfall. Drilling water wells with targets of this nature is risky and could be considered a hit or miss proposition. Therefore, this formation is considered an unreliable aquifer.



Figure 11. Contact between Redwall Limestone and Mazatzal Quartzite showing the sedimentary beds draped over the quartzite

Photograph was taken along Highway 87 at the junction of the Control Road

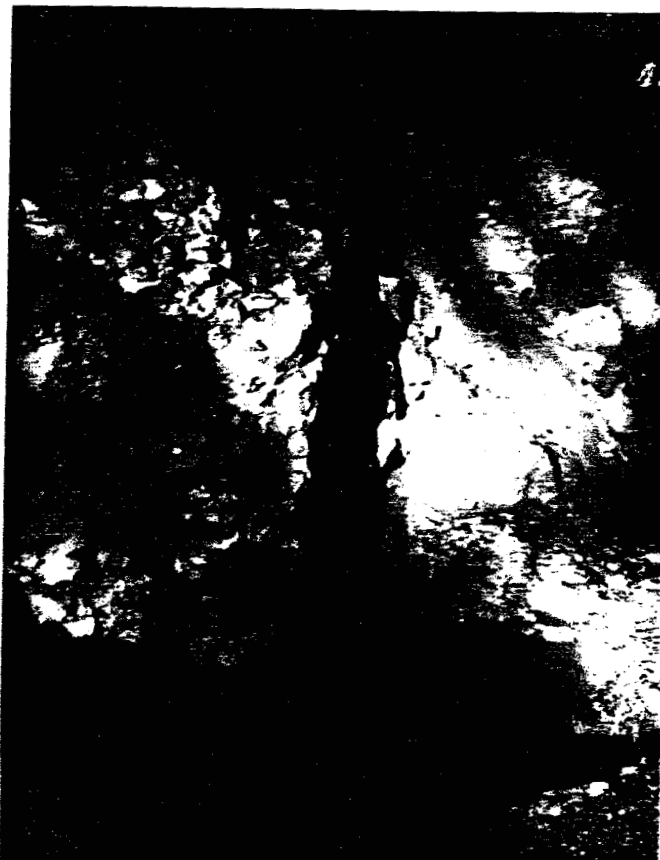


Figure 12. Solution opening along a fracture in the Redwall Limestone

The opening is about 18 inches wide and dips downward to the north. Photograph taken near Highway 87, 1.5 miles south of Pine.

Martin Formation

The Martin Formation is considered to be of Devonian age and is generally a sequence of limestones and dolomites and shales, some of which are fetid or petroliferous. Recent work by Meader (1977) on the Martin Formation in the Roosevelt Dam-Globe area divides the formation into two members, the Beckers Butte member and the Jerome member. To complete the Devonian sequence, these two members are overlain by the Percha Formation. The lowermost Beckers Butte member is described as a basal sandstone unit. This is overlain by a fetid dolomite unit of the Jerome member. Although this unit is not everywhere present within the Martin Formation, it is of concern hydrologically due to the problems encountered in drilling this formation. Previous wells that have been drilled by the water company that were reported to have penetrated this member have produced gas of sufficient quantity to cause a small explosion in the hole (Huggins, 1974).

The Martin Formation is not exposed at the surface within the area mapped due to postdepositional erosion or nondeposition during the Devonian time. Exposures of the formation can be seen south of the area where Highway 87 crosses the East Verde River (Fig. 13).

The potential of this formation as a suitable aquifer is questionable due to possible encounter with the fetid member. However, if suitable water is found in formations beneath the Martin, this zone can be cemented or blanked off. This would require careful logging during the drilling to determine the depth and thickness of the fetid unit.

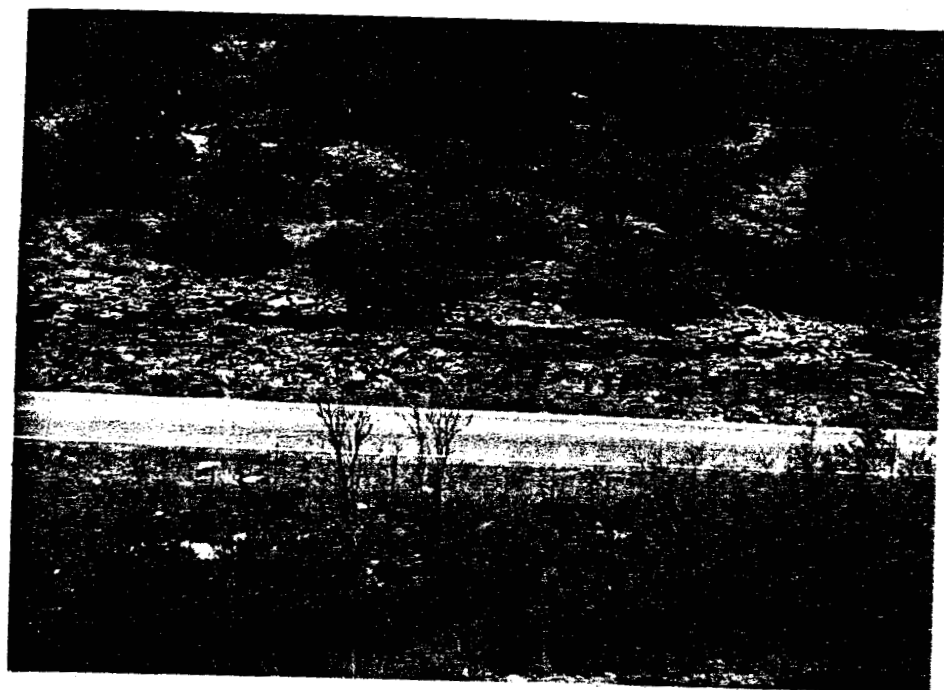


Figure 13. Exposure of the Martin Formation along Highway 37 between Pine and the East Verde River Bridge

Tapeats Sandstone

The Tapeats Sandstone of Arizona is a sandstone and conglomerate of Cambrian age. It was first described by Noble (1910). The Tapeats rests with visible angular unconformity atop the Precambrian quartzite (Fig. 14).

Samples of the Tapeats Sandstone collected at different localities during the investigation indicate a wide range of rock type. There are variations in the degree of silification and silt content which would directly affect porosity of the unit. The degree to which the unit might be jointed and fractured at depth locally is unknown. Logs of wells drilled in the Payson area are reported to have penetrated the Cambrian unit and are good producers of water. This unit is considered to be potentially a good aquifer, where present, even though it may require very deep drilling to test this theory.

Mazatzal Quartzite

The oldest formation found within the area mapped is the Precambrian Mazatzal Quartzite. This unit forms the ridge south of Pine. Pine Creek cuts this formation south of town at a place known as the Narrows. The stream has eroded its course along faults and fractures in the quartzite.

This hard vitreous rock is a well-silicified sandstone with visible bedding and usually disposed at high angles. The extent of the unit beneath the area is difficult to determine without geophysical methods being used. The writer believes that the quartzite was a topographic high with steep slopes. Wells drilled to moderate depths nearby have

not penetrated this unit. Most wells drilled in the vicinity of the quartzite have been dry.

Despite the fact that locally water is often seen on the surface and in contact with this unit, it is not considered to be an aquifer. It supports surface water because it has no porosity and very little permeability.

Any drilling that contacts this unit should be terminated. The possibility that water could be found within the overlying Tapeats Sandstone in erosional troughs of the quartzite should not be overlooked in any search for water at greater depths.

quartzite has been dry. This indicates that ground-water migration is greatly different than surface drainage.

Isopach maps of the Permian Supai Group (Passmore, 1969) and visible thickening of the Coconino Sandstone to the north suggest that some ground-water migration would be northward. Ground water entering permeable formations above the water table or within perched water tables would be induced to migrate downdip if between two less permeable beds. This would be the case of the Fort Apache member and its position within the Supai. This would not be the case for the Coconino Sandstone where the vertical fracturing would allow water to migrate downward. After reaching the water table, it would migrate down gradient (Fig. 15); that is, it would move from areas where the water table was at a higher elevation to where it would be in equilibrium at lower elevations. In this situation water could actually move updip. This would explain the springs issuing from the base of the Coconino, which dips northward, along the Mogollon Rim. Parsnip Spring is fed in this manner.

Permeabilities

The Coconino Sandstone is the preferred aquifer within the area mapped. The clean, loosely cemented sand grains give this unit good primary porosity. Subsequent fracturing and jointing give this formation a high permeability. Water from the formation is known to be of good quality and low in dissolved minerals. The unit is of sufficient thickness and areal extent to contain reserves of sufficient quantity for municipal use. Recharge of the aquifer through rainfall and snow melt

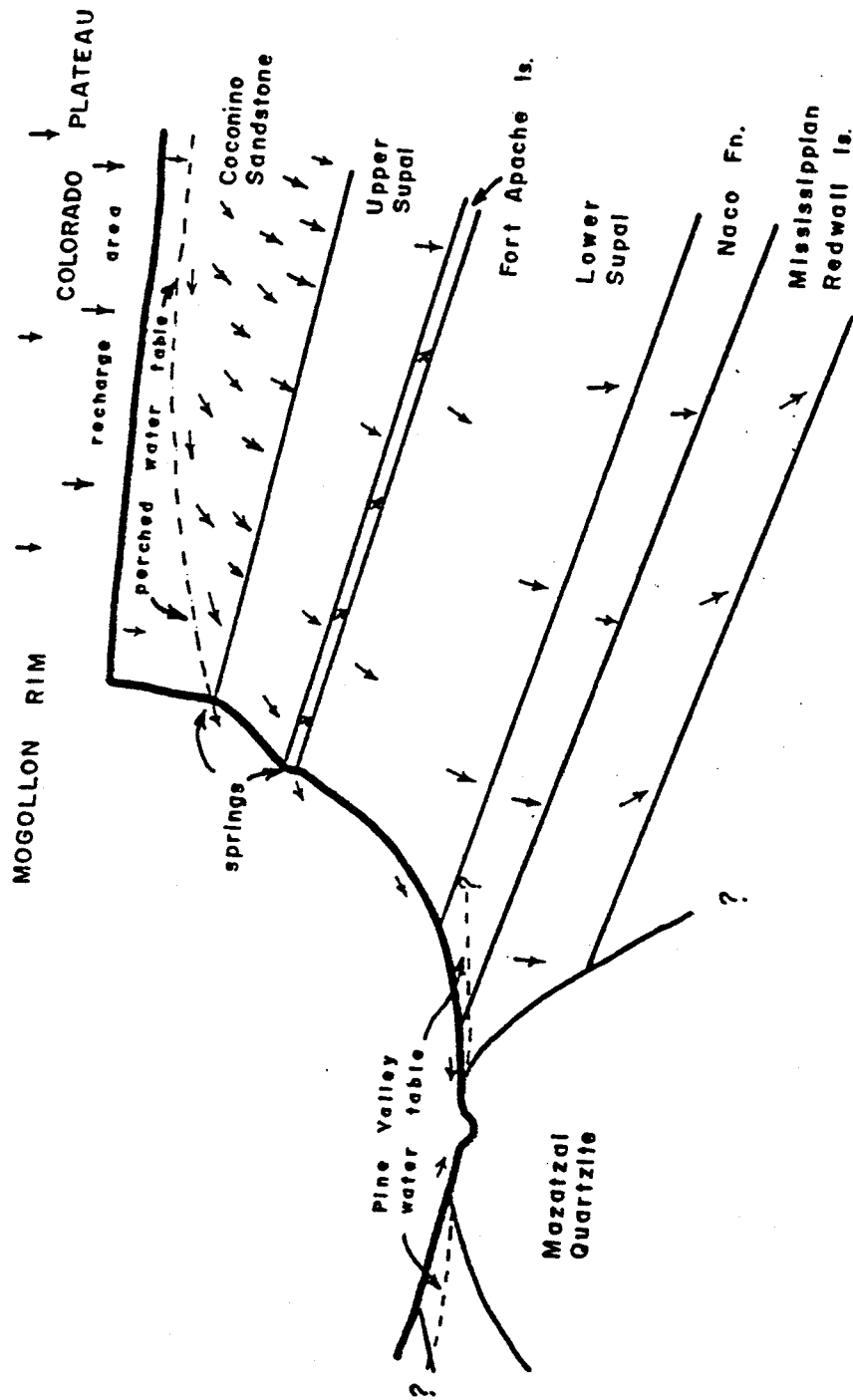


Figure 15. A model showing direction of ground-water movement within the study area. Drawing not to scale.

is dependable and abundant. Ground water within this unit would be classified as a perched water table because it is prevented from further downward movement by the Supai Group. Despite this, wells drilled into the Supai in the area investigated do manage to produce 20-30 gallons per minute for short periods of time. Most of these wells go dry, or nearly so, every summer with increased use. Fracturing or faulting at depth may account for higher than expected permeabilities.

The Fort Apache Limestone member of the Supai has the highest permeability. This is due to dissolving of limestone along joints. Hydrologically, this unit is not sufficiently thick locally to contain adequate reserves and recharge is very slow. The Mississippian Redwall and Devonian Martin formations also have low permeabilities, which probably decrease with depth. The presence of solution channels through these units at depth does not make them a viable aquifer. The permeability of the basalts within the area is thought to be high based on occurrences in other areas of the state. This theory has not been tested within the area studied. Additional work will be necessary regarding this potential aquifer.

Springs

Numerous springs within the area studied indicate the presence of underground water; however, this writer does not believe that they are a good potential source of water for municipal supplies. Traditionally,

these springs are subject to fluctuations in rainfall and are known to go dry annually.

Water-table Levels

One of the major steps of the present study was an accurate sounding of water wells in Pine Valley to prepare a water-table map (Plate 2). All wells of the E & R Water Company were sounded with an electric wire-line well sounder on December 11, 1977. All values shown on Plate 2 for the Pine area are from this sounding survey. Values for contouring in the Strawberry area are from soundings reported by the Arizona Water Commission (1974). Data for all wells are given in the appendix.

The method used to compute the water-table levels was to subtract the depth to water (in feet) from the altitude of the well collar. The derived values were plotted on the base map and contoured at 20-foot intervals. The water table at dry wells was interpreted as being lower than the depth of the well at that point.

The contoured surface represents a picture of the upper surface of the water table. Interpretation of this surface indicates that the water table rises with the topographic slopes of the Supai formations. The shallowest depths to water are along Pine Creek. From the center of section 19 north, the water table is equal to or slightly higher than the elevation of the stream. Evidence of this is that Pine Creek flows here but goes underground below this point. Interpretations for the area are restricted by the limited number of data points; furthermore, all wells are in the same aquifer.

The soundings in the Pine area were made after a period of two to three months of relatively little rain. A resurvey of the water-table levels should be taken again in the spring after a period of heavy rainfall or snow melt, and the resultant map compared to the present one.

A program of pump tests performed on company-owned wells would show where the more permeable zones of the Supai formations are. These zones could then be compared to the water-table map.

along fractures in the Redwall Limestone is channeling water away from the Pine-Strawberry area.

The limited production from the wells in the Pine-Strawberry area may be attributed to their design as much as to their location. In the past, wells drilled in the area have been cable-tool drilled and fitted with casing of Mills knife or torch-cut slots. Few, if any, records exist of these wells and their production. Vital data such as formations penetrated, where openings in the casing were located, specific capacities, drawdowns, etc. are missing. Wells of improved yield could be made with a better understanding of the hydrologic transmissibility of the Supai Group. More information about the subsurface flow of water is vitally needed. This information can be developed from existing wells and geophysical surveys.

RECOMMENDATIONS

Because it is costly to maintain a large number of wells in a public supply system, it is clear that better yielding wells are a more viable solution than more marginal ones. The following recommendations are therefore made:

1. Begin a program of scheduled well soundings of all wells owned by the E & R Water Company in the two valleys. This should include monitoring abandoned wells that are far enough away from producing wells to be outside the cone of depression. These wells should be sounded monthly as well as periodically after significant rainfalls and during snow melts.
2. Perform pump tests on existing wells to determine their specific production capacities in terms of gallons pumped per foot of drawdown. Measure the total depth of all wells with a weighted marked wire or suitable measuring device.
3. Categorize each existing well as a good, marginal, or poor producer and if it draws sand and silt.
4. Using this information as well as data on water-table levels, select sites near good producers for redrilling new wells of comparable or slightly greater depth.
5. Solicit bids from drillers who have had experience in drilling the formations expected.
6. New wells should be rotary drilled and reamed out to the maximum economically feasible size.

7. The new wells should be designed to allow the maximum amount of area to be exposed to the well. This could be accomplished by drilling an oversize hole of 20-30 inches with an 8-10-inch well casing of screen type, such as Johnson well screen or Layne shutter screen. Such well screens provide the maximum area for water entry with a minimum restriction. In formations such as the Supai, every possible effort must be made to minimize the restrictions to water entering the well.
8. The annular space between the oversize hole and the well screen should be packed with sorted gravel to filter out the silt that is present in these formations and to maintain the walls of the hole.
9. During the drilling of the pilot hole take careful samples and accurately record the depths from which they came. Note sections of the formation that appear to yield water as well as those that appear to be unconsolidated or are well silicified. Note zones of clay that will yield no water but will contribute sediments to the well.
10. Both geological and geophysical work should be done to determine subsurface geology so as to be able to correlate drill-hole logs. Water-temperature surveys down existing water wells and gravity surveys are two methods that could be used. Work done by D. J. Supkow in the Tucson Basin with accurate temperature measurements taken at a constant depth throughout the area show good results at delineating zones of maximum ground-water migration. This method should work well in the Pine area to determine flow directions of ground water within the Supai Group.

11. Investigate land ownerships in the area of upper Pine Canyon for possible well sites in the Coconino Sandstone and upper Supai beds. Drill a small-diameter well to test these aquifers.

APPENDIX

DATA FOR WELLS IN THE PINE-STRAWBERRY AREA

Table A-1 is a summary of water-table levels and yields for wells in the Pine-Strawberry area compiled from data collected during this study and data reported by the Arizona Water Commission (1977). Detailed data for each well and two springs (Dripping and Fuller) follow.

Table A-1. Water-table levels, Pine area

Well Location and Number	Well- Collar Elevation (feet)	Total Depth (feet)	Year Sounded	Depth to Water (feet)	Yield (gal/min)
A(12-8)(25-1)acc	5,600	233	1971		35
A(12-8)(25-2)acd	5,580	177	1971	72	30
A(12-8)(25-3)daa*	5,560		1977	91.9	10-15
A(12-8)(25-4)ccc*	5,490		1977	57.2	
A(12-8)(25-5)dab*	5,510		1977	81.5	4-5
A(12-8)(25-6)ada*	5,520		1977	116(?)	abn.
A(12-8)(25-7)abb	5,810			dry	dry
A(12-8)(25-8)cac	5,520	208	1971	96	20
A(12-8)(25-9)cac	5,525		1974	63	
A(12-8)(25-10)cca	5,517	200	1958	56	
A(12-8)(25-11)cdd	5,400	240	1974	31	
A(12-8)(25-12)cdc	5,460	200	1974	104	10
A(12-8)(26-1)dac*	5,580	280	1974		
A(12-8)(26-2)dad*	5,620	440	1974		
A(12-8)(26-3)dad	5,620	100	1973	75	
A(12-8)(35-1)dab*	5,520	850	1974	dry	dry
A(12-8)(35-2)ddc*	5,560		1977	dry	dry
A(12-8)(35-3)ddb	5,490		1977	23.1	3
A(12-8)(35-4)ddb*	5,580		1977	dry	dry
A(12-8)(35-5)aaa*	5,498		1977	42.0	

Table A-1. Water-table levels, Pine area—continued

Well Location and Number	Well- Collar Elevation (feet)	Total Depth (feet)	Year Sounded	Depth to Water (feet)	Yield (gal/min)
A(12-8)(36-1)cbb	5,540		1976	dry	dry
A(12-8)(36-2)add	5,420	910	1974	574	0
A(12-8)(36-3)bba	5,520	180	1974	45	
A(12-9)(19-1)ccc*	5,620		1977	85.2	
A(12-9)(19-2)cdb	5,620	180	1976		18
A(12-9)(19-3)bcc	5,660	180	1976	50	12
A(12-9)(19-4)ccb	5,660	140	1976	80	11
A(12-9)(30-1)bbd*	5,580		1977	28.1	
A(12-9)(30-2)bba*	5,580	75	1977	40	
A(12-9)(30-3)bbb*	5,570	134	1977	31	
A(12-9)(30-4)bba	5,550	60	1968	30	

* Wells owned by E & R Water Company

WATER WELL DATA COLLECTION FORM

WELL NO. ER A(12-8) dab
 NAME. (21-5)
 OWNER E & R Water Co.

DATE LOGGED: 10/21/77BY: G. HixLOCATION: Strawberry, Az.

Geographic:

Section: 21 Twp 12N Rng: 8 E NW, NE, SEU.S.G.S. Topographic Map: PineCollar elevation: 5930Date Drilled: 10/5/68

C.V. Odom

Driller: Payson, Az.Well Depth: 250'Depth to water: 150'

Static: _____ Pumping: _____

Pumping rate: 50-60 gpm

Draw down: _____ Spec. capacity: _____

 casing size & type: 0 - 60' 6"

Temp. of water: _____

Sediments: _____

Color of water: Approved 10/3/69
A.S.D.H.

Remarks:

GEOLOGIC LOG

Depth	Description	Formation
• 12'	Alluvial decomposed sandstone	
• 250'	Mudstone, Limestone, Sandstone	Supai
105'	First water	
• 230'	Water increase, main source	
In this formation, the water bearing beds are only six inches to one foot thick.		

WATER WELL DATA COLLECTION FORM

WELL NO. B.D.A(12-8)
or NAME. (21-8) cch
OWNER Bacil T. Dick

DATE LOGGED: 10/21/77
BY: G. Hix

LOCATION:

Geographic:
Section: 21 Twp 12 N Rng: 8 E NW, SW, SW
U.S.G.S. Topographic Map: Strawberry
Collar elevation: 5800'

Date Drilled: 11/27/74

Driller: G.V. ODOM
Payson, Az.

Total Depth: 180'

Depth to water:

Static: 92' Pumping: -

Pumping rate: 36 gpm

Draw down: - Spec. capacity: -

Casing size & type: steel, 40' of surface pipe.

Temp. of water: -

Sediments: -

Color of water: -

Remarks: From State Land Dept.
records.

GEOLOGIC LOG

Depth	Description	Formation
0 - 13'	Clay	
13' - 112'	Mudstone & first water	Supai
112' - 180'	Mudstone, Limestone, & Shale	"

WATER WELL DATA COLLECTION FORM

WELL NO. A(12-8)
or NAME. (22-1) cac
OWNER E & R Water Co.

DATE LOGGED: 10/21/77
BY: G. Hix

LOCATION:

Geographic:
Section: 22 Twp 12N Rng: 8 E SW, NE, SW
U.S.G.S. Topographic Map: Pine
Collar elevation: 5920'

Date Drilled: 12/10/73

Driller: C.V. Odom
Payson, Az.

Total Depth: 410'

Depth to water:

Static: 258' Pumping: -

Pumping rate: 12- 26 gpm.

Draw down: 365' Spec. capacity: -

Casing size & type:

Temp. of water: -

Sediments: -

Color of water: -

Remarks: From State Land Dept.
records.

GEOLOGIC LOG

Depth	Description	Formation
0 - 12'	Alluvial	
12' - 410'	Shale, Mudstone, Limestone	Supai
160'	First water	

WATER WELL DATA COLLECTION FORM

WELL NO. R N A(12-8)
 or NAME. (28-1) bba
 OWNER Robert Nuttall

DATE LOGGED: 10/21/77
 BY: G. Hix

LOCATION:

Geographic: Strawberry, Az.
 Section: 28 Twp 12N Rng: 8 E NE, NW, NW
 U.S.G.S. Topographic Map: Strawberry
 Collar elevation: 5795'

Date Drilled: 1/28/76

Temp. of water: -

Driller: C. V. Odom
Payson, Az.

Sediments: -

Total Depth: 200'

Color of water: -

Depth to water: 45'

Remarks: From State Land Dept.
records.

Static: _____ Pumping: _____

Pumping rate: 10 - 16 gpm.

Draw down: _____ Spec. capacity: _____

Casing size & type: steel

GEOLOGIC LOG

Depth	Description	Formation
0 - 26'	Alluvium	
26' - 75'	Mudstone and shale	Supai
75'	First water	
76' - 200'	Mudstone and limestone	

WATER WELL DATA COLLECTION FORM

WELL NO. (12-8)
 or NAME. (25-1) sac
 OWNER Austin Myers

DATE LOGGED: 10/21/77
 BY: G. Hix

LOCATION: Portal Subdivision

Geographic:
 Section: 25 Twp 12N Rng: 8 E SW, NE, NE
 U.S.G.S. Topographic Map: Pine
 Collar elevation: 5690'

Date Drilled: 3/26/71

Temp. of water: -

Driller: Joe Harness
Tucson, Az.

Sediments: -

Total Depth: 233'

Color of water:

Depth to water:

Remarks: From State Land Dept.
records.

Static: - Pumping: -

Pumping rate: 35 gpm.

Draw down: - Spec. capacity: -

Casing size & type: 5 9/16" ID Perforations 170' to 233'

GEOLOGIC LOG

Depth	Description	Formation
0 - 10'	Reddish brown adobe clay	
10 - 20'	Clay with chips of gray limestone	
20' - 50'	Reddish brown clay with reddish brown sandstone	
50' - 110'	Reddish brown clay with sandstone and limestone	
110' - 180'	Clay with hard brown fine grained sandstone	
180' - 233'	Gray-reddish brown fine grained limy sandstone, no clay.	

WATER WELL DATA COLLECTION FORM

WELL NO. A(12-8) acd
 or NAME. (25-2)
 OWNER Austin Myers

DATE LOGGED: 10/21/77
 BY: G. Hix

LOCATION:

Geographic: Portal Subdivision
 Section: 25 Twp: 12N Rng: 8 E SE, SW, NE
 U.S.G.S. Topographic Map: Pine
 Collar elevation: 5580'

Date Drilled: 3/26/71

Temp. of water:

Driller: Joe Harness
Tucson, Az.

Sediments:

Total Depth: 177'

Color of water:

Depth to water:

Remarks: Geologic log from State
Land Dept. records.

Static: 72' Pumping: -

Pumping rate: 30 gpm.

Draw down: - Spec. capacity: -

Casing size & type: 5 9/16" ID, Perforations 90' to 177'

GEOLOGIC LOG

Depth	Description	Formation
0 - 10'	Reddish brown clay with some interbedded gray to brown, fine grained limy sandstone	
10 - 20'	Same with more sandstone chunks	
20' - 30'	Fine grained, hard sandstone, gray to reddish brown, with approximately 40% interbedded clay	
30' - 40'	Clay with interbedded sandstone of above	
40' - 50'	Same, extremely calcareous	
50' - 60'	Same with some gray-brown limestone fragments	
60' - 70'	Same	
70' - 80'	Same, less Limestone	
80' - 90'	Approx. 50% clay and 50% iron stained, fine grained sandstone, very calcareous	
90' - 100'	Same with some gray limestone fragments	
100' - 110'	Same, less clay	
110' - 120'	Same, reddish brown sandstone, 25% clay	
120' - 130'	Same	
130' - 140'	Same, more clay	
140' - 150'	Same, less clay	
150' - 160'	Same limy sandstone as above with some gray unstained fragments.	
160' - 170'	Gray carbonaceous sandstone and arenaceous siltstone-shale	
170' - 108'	some fragments show iron staining, 40% clay.	

WATER WELL DATA COLLECTION FORM

WELL NO. A(12-8)
or NAME. (25-3) daa
OWNER E & R Water Co

DATE LOGGED: 12/11/77
BY: G.Hix

LOCATION:

Geographic:
Section: 25 Twp 12N Rng: 8 E SE, NE, NE
U.S.G.S. Topographic Map: Pine
Collar elevation: 5560'

Date Drilled: Unk.

Temp. of water: -

Driller: Unk.

Sediments: -

Total Depth: Unk.

Color of water: -

Depth to water:
Static: 91.9' Pumping: -

Remarks: Purchased by E & R Water Co

Pumping rate: 10-15 gpm

Draw down: - Spec. capacity: -

Casing size & type: 6" steel

GEOLOGIC LOG

Depth

Description

Formation

WATER WELL DATA COLLECTION FORM

WELL NO. A(12-8)
or NAME. (25-4) ccc
OWNER E & R Water Co.

DATE LOGGED: 12/11/77
BY: G. Hix

LOCATION:

Geographic:
Section: 25 Twp. 12N Rng: 8 N SW,SW,SW
U.S.G.S. Topographic Map: Pine
Collar elevation: 5490'

Date Drilled: Unk.

Temp. of water: -

Driller: Unk.

Sediments: -

Total Depth: Unk.

Color of water: -

Depth to water:

Static: 57.2' Pumping: -

Remarks: Water could be heard falling
down the well while sounding.

Pumping rate: - gpm.

Draw down: - Spec. capacity: -

Casing size & type: 6" steel

GEOLOGIC LOG

Depth

Description

Formation

WATER WELL DATA COLLECTION FORM

WELL NO. A(12-8)
or NAME. (25-5) dab
OWNER E & R Water Co.

DATE LOGGED: 12/11/77
BY: G. Hix

LOCATION:

Geographic: Pine Canyon
Section: 25 Twp 12N Rng: 8 E NW, NE, SE
U.S.G.S. Topographic Map: Pine
Collar elevation: 5510'

Date Drilled: Unk.

Temp. of water: -

Driller: Unk.

Sediments: -

Total Depth: Unk.

Color of water: -

Depth to water:

Remarks:

Static: - Pumping: 81.5'

Pumping rate: 4-5 gpm

Draw down: - Spec. capacity: -

Casing size & type: 6" steel

GEOLOGIC LOG

Depth

Description

Formation

WATER WELL DATA COLLECTION FORM

WELL NO. A(12-8) (25-6) ada
or NAME. Abandoned well site
OWNER E & R Water Co.

DATE LOGGED: 12/11/77
BY: G. Hix

LOCATION:

Geographic: Pine Canyon
Section: 25 Twp 12N Rng: 8 E NE, SE, NE
U.S.G.S. Topographic Map: Pine
Collar elevation: 5520'

Date Drilled: Unk.

Temp. of water: -

Driller: Unk.

Sediments: -

Total Depth: Unk.

Color of water: -

Depth to water:

Static: 116' Pumping: -

Remarks: On this date, the sound of water falling can be heard in the well. Reported to pump dry in a short time when last used.

Pumping rate: - gpm

Draw down: - Spec. capacity: -

Casing size & type: 6" steel

GEOLOGIC LOG

Depth

Description

Formation

WATER WELL DATA COLLECTION FORM

WELL NO. ER #1
 or NAME. A(12-8) (26-1) dac
 OWNER E & R Water Co.

DATE LOGGED: 10/21/77
 BY: G. Eix

LOCATION:

Geographic:
 Section: 26 Twp 12N Rng: 8 E SW, NE, SE
 U.S.G.S. Topographic Map: Pine
 Collar elevation: 5580'

Date Drilled: 1974

Temp. of water: -

Driller:

Sediments: -

Total Depth: 280'

Color of water: -

Depth to water:

Remarks:

Static: _____ Pumping: _____

Pumping rate: _____ gpm

Draw down: _____ Spec. capacity: _____

Casing size & type: 120' to 270' machine perforated

GEOLOGIC LOG

Depth	Description	Formation
0 - 20'	Clean buff colored sandstone with rounded fine grains.	Supai
20' - 60'	Cocoa brown silty limestone and limy siltstone	
60' - 110'	Same with gray coloration	
110' - 160'	Same, predominantly dark brown calcareous sandstone, fine grained.	
160' - 240'	Gray, very calcareous sandstone with brown hard limestone-siltstone fragments.	
240' - 280'	Same, including fragments of hard dense, gray limestone	

WATER WELL DATA COLLECTION FORM

WELL NO. ER #2
 OR NAME. A(12-8) (26-2) dad
 OWNER E & R Water Co.

DATE LOGGED: 10/21/77BY: B. Hix

LOCATION:

Geographic:
 Section: 26 Twp 12N Rng: 8 E SE, NE, SE
 U.S.G.S. Topographic Map: Pine
 Collar elevation: 5620'

Date Drilled: 1974

Temp. of water:

Driller:

Sediments:

Total Depth: 440'

Color of water:

Depth to water:

Remarks:

Static: _____ Pumping: _____

Pumping rate: _____ gpm.

Draw down: _____ Spec. capacity: _____

Casing size & type: 100' to 232' Mills knife, 4 every 12"

GEOLOGIC LOG

Depth	Description	Formation
0 - 10'		
10' - 60'	Clay with chunks of tan, brown and gray sandstone and siltstone fragments	Supai
60' - 120'	Brown and gray coarse mudstone and siltstone fragments, very little clay. Chunks gray limestone	
120' - 160'	Brown-dark gray very fine sandstone and siltstone	
160' - 240'	Gray, very fine grained sandstone and brown quartz sandstone, high calcium carbonate content	
240' - 320'	Same	
320' - 400'	Brown, fine grained sandstone and gray, very fine grained siltstone, very limey	
400' - 440'	Redish brown, fine grained sandstone with gray, very fine grained siltstone, very limey.	

WATER WELL DATA COLLECTION FORM

WELL NO. A(12-8)
or NAME. (26-3) dad
OWNER Austin Myers

DATE LOGGED: 10/21/77BY: G. Hix

LOCATION:

Geographic:
Section: 26 Twp 12N Rng: 8 E SE, NE, SE
U.S.G.S. Topographic Map: Pine
Collar elevation: 5620'

Date Drilled: 12/30/73

Temp. of water: -

Driller: Harness Drilling Co.
Tucson, Az.

Sediments: -

Total Depth: 100'

Color of water: -

Depth to water:

Static: 75' Pumping: -Remarks: From State Land Office
records.Pumping rate: 20 gpmDraw down: - Spec. capacity: -Casing size & type: 4" Plastic

GEOLOGIC LOG

Depth	Description	Formation
0 - 10'	Surface Pipe	
10' - 100'	Red Sandstone with streaks of sand	

WATER WELL DATA COLLECTION FORM

WELL NO. Lot 25 A(12-8)or NAME. (35-1) dabOWNER E & R Water Co.DATE LOGGED: 12/11/77BY: G. HixLOCATION: Strawberry Mt. Shadows

Geographic:

Section: 35 Twp 12N Rng: 8 EU.S.G.S. Topographic Map: PineCollar elevation: 5520'Date Drilled: 7/29/74 to 9/24/74Temp. of water: -Driller: Elmer L. WhiteSediments: -Total Depth: 850'

Color of water:

Depth to water:

Static: - Dry Pumping: -Remarks: Geologic log from State
Land Dept. records.Pumping rate: - gpm.Draw down: - Spec. capacity: -

Casing size & type:

GEOLOGIC LOG

Depth	Description	Formation
0 - 318'		Supai
318' - 447'		Miss. Redwall
447' - 810'		Devonian
810' - 850'		Cambrian

WATER WELL DATA COLLECTION FORM

WELL NO. E. R. A(12-8)
or NAME. (35-2) ddc
OWNER E. & R. Water Co.

DATE LOGGED: 12/11/77
BY: G. Hix

LOCATION: Lot 52
Strawberry Mt. Shadows
Geographic:
Section: 35 Twp 12N Rng: 8 E SW, SE, SE
U.S.G.S. Topographic Map: Pine
Collar elevation: 5560'

Date Drilled: 1974

Temp. of water: -

Driller: Elmer White

Sediments: -

Total Depth: ?

Color of water: -

Depth to water:

Remarks: capped

Static: - Pumping: -

Pumping rate: 3 gpm.

Draw down: - Spec. capacity: -

Casing size & type: 6" steel

GEOLOGIC LOG

Depth

Description

Formation

WATER WELL DATA COLLECTION FORM

WELL NO. E.R. A(12-8)
or NAME. (35-3) ddb
OWNER E & R Water Co.

DATE LOGGED: 12/11/77
BY: G. Hix

LOCATION: Strawberry Mt. Shadows
Lot 44

Geographic:
Section: 35 Twp 2 N Rng: 8 E NW, SE, SE
U.S.G.S. Topographic Map: Pine
Collar elevation: 5490'

Date Drilled: 1974

Temp. of water: -

Driller: Elmer White

Sediments: -

Total Depth: ?

Color of water: -

Depth to water:

Remarks:

Static: 23.1' Pumping: -

Pumping rate: 3 gpm.

Draw down: - Spec. capacity: -

Casing size & type: 6" steel

GEOLOGIC LOG

Depth	Description	Formation
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WATER WELL DATA COLLECTION FORM

WELL NO. E. R. A(12-8)
or NAME. (35-4) ddb
OWNER E. & R. Water Co.

DATE LOGGED: 12/11/77
BY: G. Hix

LOCATION: Lot 20
Strawberry Mt. Shadows
Geographic:
Section: 35 Twp 2N Rng: 8 E NW, SE, SE
U.S.G.S. Topographic Map: Pine
Collar elevation: 5580'

Date Drilled: 1974

Temp. of water: -

Driller: Elmer White

Sediments: -

Total Depth: ?

Color of water: -

Depth to water: Dry
Static: _____ Pumping: _____

Remarks:

Pumping rate: _____ gpm

Draw down: _____ Spec. capacity: _____

Casing size & type: 6" steel

GEOLOGIC LOG

Depth	Description	Formation
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WATER WELL DATA COLLECTION FORM

WELL NO. E. R. A(12-8)
 or NAME. (35-5) 222
 OWNER E. & R. Water Co.

DATE LOGGED: 12/11/77

BY: G. Hix

LOCATION: Cool Pines Subd.

Geographic:
 Section: 35 Twp 12N Rng: 8 E NE, NE, NE
 U.S.G.S. Topographic Map: Pine
 Collar elevation: 5498'

Date Drilled: Unk.

Temp. of water: -

Driller: Unk.

Sediments: -

Total Depth: Unk.

Color of water: -

Depth to water:

Static: 42.0' Pumping: -

Remarks: Purchased by E & R Water Co. No previous records of well available.

Pumping rate: - gpm

Draw down: - Spec. capacity: -

Casing size & type: 6" steel

GEOLOGIC LOG

Depth	Description	Formation
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WATER WELL DATA COLLECTION FORM

WELL NO. DTS
 or NAME. A(12-8) (36-1) cbb
 OWNER Dolald T. Smith

DATE LOGGED: 10/21/77
 BY: G. Hix

LOCATION:

Geographic:
 Section: 36 Twp 12N Rng: B E
 U.S.G.S. Topographic Map: Pine
 Collar elevation: 5440'

Date Drilled: 2/15/76

Temp. of water: -

Driller: C.V. Odom
Payson, Az.

Sediments: -

Total Depth: 120'

Color of water: -

Depth to water:

Static: Dry Pumping: -

Remarks: From State Land Office records. Arizona Water Comm. Repo shows a well in same location of 734' deep, 336' to water.

Pumping rate: - gpm.

Draw down: - Spec. capacity: -

Casing size & type: No casing set

GEOLOGIC LOG

Depth	Description	Formation
0 - 4'	Alluvium	
4' - 120'	Limestone	

WATER WELL DATA COLLECTION FORM

WELL NO. S.T.W. A(12-9) (19-1) ccc
or NAME. Spring Tank Well
OWNER E. & R. Water Co.

DATE LOGGED: 12/11/77
BY: G. Hix

LOCATION: Lot 6 Brookview Terrace #2

Geographic:
Section: 19 Twp: 12N Rng: 9E SW, SW, SW
U.S.G.S. Topographic Map: Pine
Collar elevation: 5620'

Date Drilled: Unk.

Temp. of water:

Driller: Unk.

Sediments:

Total Depth: Unk.

Color of water:

Depth to water:

Static: 85.2' Pumping: -

Remarks: Purchased from United
Utilities Co.. Used in summer
peak periods for 3 hrs. at a time.

Pumping rate: - gpm

Draw down: - Spec. capacity: -

Casing size & type: 6" steel

GEOLOGIC LOG

Depth	Description	Formation
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WATER WELL DATA COLLECTION FORM

WELL NO. WG A(12-9)
OR NAME. (19-2) cdb
OWNER Wendel Gardner

DATE LOGGED: 10/21/77
BY: G. Hix

LOCATION:

Geographic:
Section: 19 Twp 2 N Rng: 9 E
U.S.G.S. Topographic Map: Pine
Collar elevation: 5620'

Date Drilled: 2/20/76

Temp. of water: -

Driller: C.V.Odom
Payson, Az.

Sediments: -

Total Depth: 180'

Color of water: -

Depth to water: -
Static: - Pumping: -

Remarks: From State Land Dept.
records.

Pumping rate: 18 gpm.

Draw down: - Spec. capacity: -

Casing size & type:

GEOLOGIC LOG

Depth	Description	Formation
0 - 60'	Overburden	
60' - 169'	Red sandstone	
140' - 169'	Water from fine sand streaks	

WATER WELL DATA COLLECTION FORM

65

WELL NO. GD A(12-9) (19-3)
or NAME. bcc
OWNER Glen Davidson

DATE LOGGED: 10/21/77
BY: G. Hix

LOCATION:

Geographic:
Section: 19 Twp 12N Rng: 9E NW, SW, SW
U.S.G.S. Topographic Map: Pine
Collar elevation: 5660'

Date Drilled: 2/20/76

C.V.Odom

Driller: Payson, Az.

Total Depth: 180'

Depth to water:

Static: 50' Pumping: -

Pumping rate: 12 gpm.

Draw down: 88' Spec. capacity: 7.33

Casing size & type: 5" Steel

Temp. of water: -

Sediments: -

Color of water: -

Remarks: From State Land Dept. records.

GEOLOGIC LOG

Depth	Description	Formation
0 - 52'	Junk	
52' - 75'	Mudstone and shale	Supai Fm.
75'	First water	
75' - 180'	Mudstone, limestone, shale	Supai Fm.

WATER WELL DATA COLLECTION FORM

WELL NO. B I A(12-9) (19-4) ccb
or NAME. _____
OWNER Bruce Isenberg

DATE LOGGED: 10/21/77
BY: G. Hix

LOCATION:

Geographic: Pine Canyon
Section: 19 Twp 12N Rng: 9 E
U.S.G.S. Topographic Map: Pine
Collar elevation: 5660'

Date Drilled: 10/6/76

Driller: C.V. Odom
Payson, Az.

Total Depth: 140'

Depth to water:

Static: 80' Pumping: -

Pumping rate: 11 gpm.

Draw down: - Spec. capacity: -

Casing size & type: 5" Steel

Temp. of water: -

Sediments: -

Color of water: -

Remarks: From State Land Dept.
Records.

GEOLOGIC LOG

Depth	Description	Formation
0 - 37'	Alluvial	
37' - 90'	Mudstone and shale	Supai
90'	First Water	
90' - 140'	Mudstone	

WATER WELL DATA COLLECTION FORM

WELL NO. A(12-9)
or NAME. (30-1) bbd
OWNER E & R Water Co.

DATE LOGGED: 12/11/77
BY: G. Hix

LOCATION: Brookview Terrace Sub.

Geographic:
Section: 30 Twp 12N Rng: 9 E SE,NW,NW
U.S.G.S. Topographic Map: Pine
Collar elevation: 5580'

Date Drilled: Unk.

Temp. of water: -

Driller: Unk.

Sediments: -

Total Depth: Unk.

Color of water: -

Depth to water:

Static: 28.1' Pumping: -

Remarks: Run for 8 hours at a time during the peak summer periods.

Pumping rate: - gpm

Draw down: - Spec. capacity: -

Casing size & type: 6" steel

GEOLOGIC LOG

Depth

Description

Formation

WATER WELL DATA COLLECTION FORM

WELL NO. E. R. A(12-9)
or NAME. (30-2) bba
OWNER E & R Water Co.

DATE LOGGED: 12/11/77
BY: G. Hix

LOCATION: Pine Canyon

Geographic:
Section: 30 Twp 12N Rng: 9 E. NE, NW, NW
U.S.G.S. Topographic Map: Pine
Collar elevation: 5580'

Date Drilled: Unk.

Temp. of water: -

Driller: Unk.

Sediments: -

Total Depth: 75'

Color of water: -

Depth to water:

Remarks:

Static: 40' Pumping: -

Pumping rate: ? gpm.

Draw down: - Spec. capacity: -

Casing size & type: 6" Steel

GEOLOGIC LOG		
Depth	Description	Formation

WATER WELL DATA COLLECTION FORM

WELL NO. E. R. A(12-9)
or NAME. (30-3) bbb
OWNER E & R Water Co.

DATE LOGGED: 12/11/77
BY: G. Hix

LOCATION: Pine Canyon

Geographic:

Section: 30 Twp 12N Rng: 9 E.

U.S.G.S. Topographic Map: Pine

Collar elevation: 5570'

Date Drilled: Unk.

Temp. of water: -

Driller: Unk.

Sediments: -

Total Depth: 134'

Color of water: -

Depth to water:

Remarks:

Static: 31 Pumping: -

Pumping rate: - gpm.

Draw down: - Spec. capacity: -

Casing size & type: 6" Steel

GEOLOGIC LOG

Depth

Description

Formation

NATURAL SPRING INVESTIGATION FORM

Spring: Dripping SpringsDate observed: 12/10/77By: G.L. Hix

Location:

Geographic: 1 Mile East of PineTownship 12 N, Range 8 E, Section 30 SE $\frac{1}{4}$, SE $\frac{1}{4}$ Elevation: 6200'USGS topo. map. Pine Is spring shown: YesDischarge: est. 10 gpm.

Geology:

Rock unit spring discharges from: Fort Apache ls. and Supai.Structural control: Permeable ls. bed between less permeable siltstones.Natural drainage from spring: A series of seeps drain into gulley and dissappear 200' down stream.Development: NoneSample. Water.Geologic: 1218 & 1219Where taken: 1218-Ft. Apache Ls. 1219-Calcium carbonate build u

Temperature:

Surface contamination that might affect sample:

Owner:

Other comments: Area above and to the South of the spring has little vegetation cover. appears to be the surface of a slump fault. Debris below spring may have come from up slope. Cliff of Ft. Apache above spring is jointed with solution cavaties.

NATURAL SPRING INVESTIGATION FORM

Spring: Fuller SpringDate observed: 12/10/77By: G. Hix

Location:

Geographic:

Township 12 N, Range 8 E, Section approx. center 23.Elevation: 6180'USGS topo map. Pine Is spring shown: YesDischarge: Dry at pres gpm.

Geology:

Rock unit spring discharges from: Fort Apache ls.Structural control: Outcrop of permeable zone.Natural drainage from spring: Down a gulley westward.Development: NoneSample. Water. Geologic: 1217Where taken: From Fort Apache ls. at source.Temperature: -

Surface contamination that might affect sample:

Owner: Unk.Other comments: Probable slump block found down stream.

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B

1

BEFORE THE ARIZONA CORPORATION COMMISSION

RENZ D. JENNINGS
Chairman
MARCIA WEEKS
Commissioner
DALE H. MORGAN
Commissioner

IN THE MATTER OF THE APPLICATION)
OF E&R WATER COMPANY FOR A)
CURTAILMENT ORDER FOR ITS PINE)
AND STRAWBERRY SYSTEMS.)

DOCKET NO. U-1576-89-169

DECISION NO. 56539

ORDER

Arizona Corporation Commission

DOCKETED

JUL 12 1989

Open Meeting
July 12, 1989
Phoenix, Arizona

BY THE COMMISSION:

DOCKETED BY

FINDINGS OF FACT

1. On July 7, 1989, E&R Water Company (E&R), filed an application with the Arizona Corporation Commission (Commission), requesting authority to curtail usage of the customers and place a moratorium on its service connections in its Pine and Strawberry Systems.

2. E&R is a public service corporation which provides water utility service to the public in Pine and Strawberry, Arizona.

3. The Pine and Strawberry Systems are located in Pine and Strawberry, Arizona, approximately 20 miles northeast of Payson, Arizona. The Pine and Strawberry Systems serves approximately 1,850 service connections.

4. The E&R Pine and Strawberry Systems have been affected by the drought that has lowered the water table and has created an emergency situation.

5. In the application E&R has requested Commission authority to curtail usage by imposing the following restrictions:

- 1 A. No new water service connections be made;
2 B. Water be used for customary household purposes only,
3 such as cooking, sanitation, and bathing, etc.; and
4 C. No water to be used outdoors on such things as
5 gardens, lawns, washing cars or watering roads.
6 6. Staff has reviewed the application and has recommended
7 that:

- 8 A. The Commission approve E&R's request discussed in
9 Finding of Fact No. 5;
10 B. The curtailment and moratorium on service connections
11 shall remain in effect until E&R determines that it
12 can meet the demand for outside watering and normal
13 household usage. The curtailment shall not extend
14 beyond October 1, 1989, without further approval of
15 the Commission;
16 C. E&R be permitted to terminate service to those
17 customers who do not comply with the curtailment
18 order; and
19 D. That E&R notify its customers of the curtailment order
20 within five (5) days of the Commission's order.
21

22 CONCLUSIONS OF LAW

- 23 1. E&R is a public service corporation within the meaning of
24 Article XV of the Arizona Constitution.
25 2. The Commission has jurisdiction over E&R and of the
26 subject matter of the application.
27 3. The Commission, having reviewed E&R's application and
28 Staff's Memorandum, dated July 10, 1989, concludes that it is in
the public interest to approve a temporary curtailment subject to
the requirements of Finding of Fact No. 6.

25 . . .

26 . . .

27 . . .

28 . . .

JL0540.0

Decision No. 56539

PW 0001-000027

ORDER

1
2 THEREFORE IT IS ORDERED that E&R Water Company be authorized
3 to curtail water usage subject to the requirements of Finding of
4 Fact No. 6.

5 IT IS FURTHER ORDERED that during the period when these water
6 usage restrictions are effective, E&R's tariffed reconnection rate
7 shall be applied to any service terminated for failure to comply
8 with the curtailment conditions.

9 IT IS FURTHER ORDERED that this Decision shall become
10 effective immediately.

11 BY ORDER OF THE ARIZONA CORPORATION COMMISSION

12
13 
14 CHAIRMAN

13 
14 COMMISSIONER

13 
14 COMMISSIONER

15 IN WITNESS WHEREOF, I JAMES MATTHEWS,
16 Executive Secretary of the Arizona
17 Corporation Commission, have hereunto
18 set my hand and caused the official
19 seal of this Commission to be affixed
20 at the Capitol, in the City of Phoenix,
21 this 12 day of July, 1989.

19 
20 JAMES MATTHEWS
21 Executive Secretary

22
23 DISSENT _____

24 GY:SJD:jl:lh

25
26
27
28 JL0540.0

Decision No. 56539

BEFORE THE ARIZONA CORPORATION COMMISSION

RENZ D. JENNINGS
Chairman
MARCIA WEEKS
Commissioner
DALE H. MORGAN
Commissioner

IN THE MATTER OF E&R WATER COMPANY,)
PINE AND STRAWBERRY SYSTEM -)
AMENDMENT OF DECISION NO. 56539.)

DOCKET NO. U-1576-89-169

DECISION NO. 56654

ORDER

Arizona Corporation Commission

DOCKETED

OCT 6 1989

Open Meeting
October 4, 1989
Phoenix, Arizona

BY THE COMMISSION:

DOCKETED BY

JH

FINDINGS OF FACT

1. On July 12, 1989, the Arizona Corporation Commission (Commission), issued Decision No. 56539 granting E&R Water Company (E&R), a curtailment and moratorium on service connections in its Pine and Strawberry systems through October 1, 1989, or until E&R determined that a water shortage no longer exists.

2. E&R is a public service corporation which provides water utility service to the public in Pine and Strawberry, Arizona.

3. The Pine and Strawberry systems are located in Pine and Strawberry, Arizona, approximately twenty miles northeast of Payson, Arizona. The Pine and Strawberry systems serve approximately 1,850 service customers.

4. Staff has continuing concerns about E&R's capacity to serve the Pine area. E&R normally has a water production capacity of 320 gallons per minute in its Pine system, while current peak

...

...

1 daily demand is approximately 104 gallons per minute. However,
2 during the past several years, E&R has experienced shortages during
3 the summer seasons when water production decreases.

4 5. Staff is concerned about E&R's ability to provide adequate
5 service to existing customers in its Pine system if it adds new
6 main extensions or new connections. Thus, Staff recommends that
7 the moratorium on new main extensions and new connections in the
8 Pine system be continued until E&R can demonstrate that it can
9 provide adequate service through encouraging and implementing
10 conservation measures and obtaining additional water sources. In
11 seeking to lift these restrictions, E&R should demonstrate that the
12 combination of conservation measures and new water sources results
13 in sufficient year round capacity.

14 CONCLUSIONS OF LAW

15 1. E&R is an Arizona public service corporation within the
16 meaning of Article XV, Section 2, of the Arizona Constitution.

17 2. The Commission has jurisdiction over E&R and over the
18 subject matter of the application.

19 3. The Commission, having reviewed E&R's ability to provide
20 an adequate and continuous service, and Staff's Memorandum dated
21 September 21, 1989, concludes that it is in the public interest to
22 continue the moratorium on new connections and main extensions in
23 its Pine area until such time that E&R can provide a sustained
24 summer time water production in accordance with Staff's
25 recommendations.

26 . . .

27 . . .

28 . . .

ORDER

THEREFORE IT IS ORDERED that E&R be required to continue the moratorium on new connections and main extensions in its Pine system consistent with Finding of Fact No. 5.

IT IS FURTHER ORDERED that E&R submit a formal request to the Commission to lift the moratorium before adding any new connections or line extensions.

IT IS FURTHER ORDERED that this Decision shall become effective immediately.

BY ORDER OF THE ARIZONA CORPORATION COMMISSION

CHAIRMAN

COMMISSIONER

COMMISSIONER

IN WITNESS WHEREOF, I JAMES MATTHEWS, Executive Secretary of the Arizona Corporation Commission, have hereunto set my hand and caused the official seal of this Commission to be affixed at the Capitol, in the City of Phoenix, this 6 day of October, 1989.

JAMES MATTHEWS

Executive Secretary

DISSENT _____

GY:PS:rb

PW 0001-000031

RB0023.0

Decision No. 36654

3

BEFORE THE ARIZONA CORPORATION COMMISSION

DOCKETED

RENZ D. JENNINGS
CHAIRMAN
MIA WEEKS
COMMISSIONER
CARL J. KUNASEK
COMMISSIONER

JUL 18 1996

DOCKETED BY **RT**

ARIZONA CORPORATION COMMISSION,

Complainant,

vs.

E & R WATER COMPANY, INC.

Respondent.

DOCKET NO. U-1576-96-269

DECISION NO. **59753**

OPINION AND ORDER

DATE OF HEARING:

May 30, 1996

PLACE OF HEARING:

Pine, Arizona

PRESIDING OFFICER:

Jerry L. Rudibaugh

IN ATTENDANCE:

Renz D. Jennings, Chairman
Carl J. Kunasek, Commissioner

APPEARANCES:

Mr. Richard S. Williamson, President, on behalf of E & R Water Company, Inc.;

Mr. Charles M. Collins, Intervenor, in propria persona;

Mr. John O. Breninger, Intervenor, in propria persona;

Mr. Harris Scott, Intervenor, on behalf of the Pine/Strawberry Fire District; and

Ms. Janet F. Wagner, Staff Attorney, Legal Division, on behalf of the Utilities Division of the Arizona Corporation Commission.

fax transmittal memo 7871		# of pages	15
Thamson	From	ACC	
	Co.		
	Phone #		
4.2	Fax #	602.542.2129	

BY THE COMMISSION:

On May 15, 1996, the Arizona Corporation Commission ("Commission") issued Decision No. 9649, Complaint and Order to Show Cause ("OSC"), which in part ordered E & R Water Company, Inc. "E&R" or "Company") to immediately discontinue the establishment of any new connections to its Pine system until further order of the Commission.

Our May 16, 1996 Procedural Order set the above-captioned matter for hearing commencing on May 30, 1996. On May 21, 1996, the Utilities Division Staff ("Staff") of the Commission filed a Request

1 for Procedural Order ("Request") to allow a total of ten new connections. Our May 21, 1996 Procedural
2 Order granted Staff's Request. On May 23, 1996, E&R filed a Motion to Continue ("Motion") the
3 hearing until July 5 or July 8, 1996. Also on May 23, 1996, Staff filed its Response to the Motion
4 ("Response"). Pursuant to our May 24, 1996 Procedural Order, the Company's Motion was denied.

5 Mr. John O. Breninger, Mr. Charles M. Collins, and the Pine/Strawberry Fire District ("Fire
6 District") requested and were granted intervention in this matter.

7 This matter came before a duly authorized Hearing Officer of the Commission at the
8 Pine/Strawberry Community Center, Highway 87 and Randall Road, Pine, Arizona. Staff appeared
9 through counsel. Mr. Richard Williamson, President of E&R, appeared on behalf of the Company and
10 Mr. Harris Scott appeared on behalf of the Fire District. At the conclusion of the hearing, the matter was
11 adjourned pending submission of closing and reply briefs on June 10, and June 14, 1996, respectively,
12 by the various parties.

13 DISCUSSION

14 Introduction

15 E&R is an Arizona corporation engaged in providing water for public purposes in the areas of
16 Pine and Strawberry, Gila County, Arizona. E&R first received a Certificate of Public Convenience and
17 Necessity ("CC&N") in Decision No. 30820, dated March 20, 1958. The original CC&N was amended
18 several times by the Commission to include additional territory. On May 1, 1990, all the stock of E&R
19 was purchased by the Utility Systems Group, Inc. ("Utility Group"). Because the previous owners
20 (Ernest and Eleona Ralls) had difficulty providing adequate water service to its customers, the
21 Commission was cautiously optimistic that new ownership would finally resolve the water adequacy
22 problem. The following Finding of Fact extracted from Commission Decision No. 52185, dated May
23 22, 1981, expresses the on-going problem very well:

24 "2. This section of Arizona, it has been generally conceded, is one which is
25 chronically affected by water shortages, and in view of the less than normal rain-fall which has
26 characterized the recent winter-spring months, the area is experiencing unusual drought
27 conditions.

28 The Applicant has determined that the drought condition has lowered the water table on

DOCKET NO. U-1576-96-269

1 ground water and created a critical water situation in its area."

2 On July 7, 1989, E&R filed a request with the Commission for authority to curtail usage of its
3 customers and to place a moratorium on service connections in its Pine and Strawberry systems.
4 Pursuant to Decision No. 56539, dated July 12, 1989, the Commission authorized E&R to curtail water
5 usage and placed a moratorium on service connections until October 1, 1989.

6 In Decision No. 56654, dated October 6, 1989, the Commission ordered that E&R continue the
7 moratorium on new connections and main extensions in its Pine system.

8 On May 21, 1990, E&R filed a request to partially lift the moratorium on new service connections
9 by allowing ten new connections per month. The request was granted in Decision No. 57047, dated
10 August 22, 1990 by allowing ten new connections per month subject to the following conditions: (1)
11 E&R had to develop a program for efficient water use; (2) there could be no monthly carryover on the
12 service connections; (3) a lot owner's request for service would only be accepted if the owner had a
13 recent county building permit; and (4) E&R was to submit quarterly reports to Staff which provided
14 monthly information on system operations, including total number of connections, total gallons sold, well
15 and surface water production capacities, water level in wells, upgrades and repairs, and outages. The
16 moratorium on main extensions remained in place. In fact, there is no dispute that such a moratorium
17 for the Pine system still exists today.

18 Order to Show Cause

19 In the OSC, the Commission alleged three main Counts. In Count I, the Commission alleged that
20 E&R had constructed or allowed to be constructed at least three main extensions to its Pine water system:
21 one near Randall Road and Elm Street, another near Whispering Pines Road and Fawn Drive, and a third
22 in the Solitude Trails Subdivision. According to Count I, these three main extensions violate Decision
23 No. 56654.

24 In Count II, the Commission alleged that E&R had violated A.R.S. § 40-361.B by failing to
25 provide service that is in all respects adequate, efficient, and reasonable, and that will promote the
26 comfort and convenience of its customers. The Commission alleged that E&R had allowed construction
27 of new main extensions which would compromise the water capacity available to serve existing
28 customers.

DOCKET NO. U-1576-96-269

1 In Count III, the Commission alleged that E&R had violated A.A.C. R14-2-405(B)(4) by planning
2 to master meter a subdivision of single family homes. In particular, Count III alleged that E&R intended
3 to illegally provide master meter service to the Solitude Trails Subdivision.

4 As part of the OSC, Staff recommended the Commission fine E&R \$1,000.00 for each of the
5 violations alleged therein. In addition, Staff recommended that E&R be ordered to:

- 6 a. disconnect the Solitude Trails main(s) and the Whispering Pines main from the E&R
7 system;
- 8 b. maintain the Randall Road main as constructed, but refrain from installing any service
9 connections, meters, or other mains to this main;
- 10 c. continue the existing moratorium on mains established by Decision No. 56654; and
- 11 d. establish a moratorium on all new connections.

12 The OSC also ordered E&R to immediately discontinue the establishment of any new connections to the
13 Pine system until further order of the Commission.

14 Subsequent to Decision No. 59649, Staff determined that there were a small number of
15 individuals in the process of building homes within E&R's service territory who have relied upon
16 Decision No. 56654. As a result, Staff believed it was appropriate to permit a limited number of new
17 connections for those individuals who had relied upon Decision No. 56654 and met the following
18 conditions:

- 19 1. Applicants for service must have the meter and service line installation fee to E&R by
20 May 15, 1996; and
- 21 2. Applicants must have obtained a building permit from Gila County by May 15, 1996; and
- 22 3. Applicant shall have already begun construction or shall be planning to begin construction
23 by May 31, 1996; and
- 24 4. There shall be no more than ten new connections permitted until the Commission issues
25 an order in this matter.

26 Pursuant to our May 21, 1996 Procedural Order, E&R was granted authority to add up to a total
27 of ten new connections which met the four conditions specified by Staff and that also met the following
28 fifth condition:

DOCKET NO. U-1576-96-269

1 5. Applicants for service have not been added pursuant to main extensions in violation of
2 Decision No. 56654.

3 Count I

4 A Staff investigation on April 29, 1996 revealed that new main extensions had been constructed
5 by E&R in three areas in violation of Decision No. 56654. According to Staff, there was a main
6 constructed near Randall Road, another main near Whispering Pines Road, and a third in the Solitude
7 Trails Subdivision.

8 Both the Randall Road and Whispering Pine main extensions are on properties which both had
9 pre-existing main waterlines fronting the properties. In each case, the owner desired to split their land
10 into five lots in a manner which required an additional line extension. According to E&R, these
11 properties could have been served by the pre-existing waterlines if the land had been subdivided in such
12 a manner to create "slivers" which could be served from the pre-existing main line. Further, the Randall
13 Road main extension allowed for the looping of the system in a manner to alleviate a pressure problem.
14 As a result, E&R requested the complaints regarding the alleged Randall Road and Whispering Pine main
15 extensions be dismissed.

16 Staff recommended the Company be fined \$1,000 for each of these two illegal mains and that the
17 Whispering Pines main be disconnected from the system. Staff acknowledged that the Randall Road
18 main did improve pressure in that area and as a result should remain in place. However, Staff
19 recommended that E&R not establish any new service connections to the Randall Road main.

20 The Solitude Trails Subdivision is a platted 73-lot subdivision located adjacent to the Whispering
21 Pines Road. Staff determined there was an E&R main extension connected to the subdivision and Staff
22 opined that it believed the development was to going to be served by a master water meter. E&R
23 indicated that it had entered into agreements with the developer of Solitude Trails ("Developer") in April
24 of 1995 to provide water service. After the Staff had recommended denial of a similar agreement filed
25 with the Commission to service the Portal IV Subdivision, E&R and the Developer entered into new
26 agreements which voided the previous arrangements. At the same time, the Developer initiated the
27 formation of a water improvement district. Under the new agreement, E&R would transfer the water
28 from the Developer's wells into the E&R system and E&R would then wheel water for use in the

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1 Solitude Trails Subdivision. Pursuant to the new agreement, E&R would be allowed to utilize all the
2 excess water of the Developer at a rate of \$1.00 per 1,000 gallons. Further, there would be a monitoring
3 meter at the subdivision's intertie with the Pine system to insure the water use by the subdivision does
4 not exceed the water production from the Developer's wells. Pursuant to their agreement, the Developer
5 and its successors in interest agree to supply E&R with a minimum of 20 percent of the water pumped
6 from the Developer's wells. Based on the above, E&R opined the arrangement with the Developer did
7 not result in a main extension and the complaint should be dismissed.

8 In response, Staff indicated that a main is any line that will provide water to more than one
9 dwelling. Staff concluded that the Solitude Trails lines are mains, and the intertie between Solitude
10 Trails and E&R results in a main extension to the Pine system. While initially Staff recommended the
11 intertie to Solitude Trails be disconnected, after hearing of the arrangements with the Developers, Staff
12 requested an opportunity to review the overall impact on the Pine system. As a result, Staff
13 recommended the Company be ordered to submit the interconnection agreements between E&R and the
14 Developer to the Commission for its review and approval within thirty days of the date of this Order.
15 In the interim, E&R could retain the interconnection with Solitude Trails.

16 Clearly the Company is in violation of Decision No. 56654 by constructing the three mains in
17 question. We find the Company's response that it believed the Randall Road and Whispering Pines
18 mains were proper since the land could have been reconfigured in "slivers" to be manufactured and
19 totally unrealistic. Similarly, the agreement with the Developer may be an excellent agreement for E&R
20 and its customers, but that does not change the clear fact that the intertie is a main extension. As a result,
21 we concur with Staff that a fine for each of the illegal mains is appropriate. Further, because these
22 activities were occurring during a period of a water shortage, we believe the fine should be higher than
23 the minimum of \$1,000 recommended by Staff. Based on the overall evidence, we believe a fine in the
24 amount of \$5,000 per main violation or a total of \$15,000 is more appropriate.

25 We also concur with Staff's recommendation to disconnect the Whispering Pines main while
26 leaving the Randall Road main in place with the provision that no new service connections be made to
27

28
1 We note this figure does not appear to take into account any line loss.

DOCKET NO. U-1576-96-269

1 that main. Lastly, we shall order the Company to file a copy with the Commission of its interconnection
2 agreement with the Developer within 10 days of the date of this Order. Pending Staff's review and
3 recommendation to the Commission, the intertie between E&R and the Solitude Trails Subdivision
4 should remain in place.

5 Count II

6 At the same time that Staff determined there were unauthorized main extensions, they also
7 determined that the area had been under a red sign alert. The Company has designed a system of posting
8 signs of different colors to alert customers of the current water situation. The red sign means the storage
9 tanks are at fifty percent capacity and customers should voluntarily curtail usage.

10 According to A.R.S. § 40-361.B public service corporations are required to provide service that
11 will "promote the safety, health, comfort and convenience of its patrons" and that is "in all respects
12 adequate, efficient and reasonable." Staff concluded that the Company's practice of expanding its system
13 at the same time it was already unable to meet its summer peak demand was unreasonable. As a result,
14 Staff recommended the Company be fined \$1,000.

15 The Company asserted there was no evidence to support Staff's allegations. According to the
16 Company, it has invested large sums of its initial capitalization to correct problems with the system.
17 Further, the Company indicated it was currently paying for water to be hauled to the Pine system to
18 supplement supplies at a cost in excess of \$34 per 1,000 gallons. The Company believes such actions
19 even in the face of a historic drought speak of the Company's commitment to its customers.

20 While the Company cannot be held at fault for the severe drought in the area, we concur with
21 Staff's assessment of its overall management practice of expanding its system during this time. Although
22 this is an area in which water is a scarce commodity, a public service corporation has the duty to make
23 an adequate investment and to render competent and adequate service. Under the circumstances set forth
24 herein, the Company has failed that duty. We believe that the Company's actions of expanding its system
25 when it was already unable to meet its summer peak demand were unreasonable, and warrant the
26 imposition of a \$5,000 fine. This brings the total fine for Counts I and II to the amount of \$20,000. We
27 shall require the full amount to be paid within 10 days of the date of this Order. However, if the
28 Company is sold within that time, then the fines shall be reduced to \$10,000 upon the filing of

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documentation evidencing the sale.

While the Company has made its share of mistakes, we must recognize there are large problems in the area for which it has little or no control. Clearly, the Pine area is an appealing area to live as a full-time or part-time resident. More and more people are discovering this, resulting in additional growth in an area which already has difficulty meeting its water needs. The Commission recognizes that the Company needs to find a solution to providing adequate service to existing customers prior to adding new ones to the system. As a result, the Commission currently has placed a moratorium on new mains as well as new connections to the system. However, the problem is compounded by the fact that developers are receiving approval for new developments to be served by water districts. This places property owners in the Company's CC&N area at a disadvantage since they cannot build while there is a moratorium on new connections/mains, while property owners in the new developments outside the CC&N area have no such limitations. In an effort to try to ameliorate this unfair situation somewhat, we are going to permit the Company one new connection per month under the same conditions previously imposed in Decision No. 57047.

In spite of the Company's assertions to the contrary, we are not convinced it has a long-term plan in place to continue to improve the water system. As a result we are going to order the following additional actions at this time:

- (1) The Engineering Staff of the Commission shall inspect all of the Company's storage facilities and make recommendations to the Commission as to the adequacy of those storage facilities both as to the condition of the facilities as well as the amount of storage.
- (2) Effective immediately, the Company shall send a monthly report to the Director of the Utilities Division which sets forth the following information: current amount of storage; monthly production of wells; monthly gallons sold; monthly gallons hauled; and monthly non-accounted water.

Count III

When the OSC was filed, Staff believed that the Company intended to provide service to Solitude Trails via a master meter. Based on the evidence presented at the hearing, Staff has concluded that most of the lots in the Solitude Trails development have individual meter boxes installed in front of them. Accordingly, Staff agrees that E&R is not in violation of A.A.C. R14-2-405(B)(4). We concur.

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Having considered the entire record herein and being fully advised in the premises, the Commission finds, concludes, and orders that:

FINDINGS OF FACT

1. E&R is a public service corporation, certificated to provide water service in Decision No. 30820 in accordance with Article XV, Sections 2 and 3 of the Arizona Constitution and A.R.S. §§ 40-281 and -282.
2. Pursuant to the grant of authority contained in Decision No. 30820, E&R is obligated to maintain domestic water utility service in the areas of Pine and Strawberry, located approximately twenty miles northeast of Payson, Arizona.
3. On May 1, 1990, all of the outstanding shares of stock in E&R were purchased by Utility Group.
4. On May 15, 1996, the Commission issued Decision No. 59649 which ordered E&R to appear before the Commission and show cause why the Commission should not grant the relief requested therein.
5. Pursuant to our May 16, 1996 Procedural Order, the above-captioned matter was set for hearing commencing on May 30, 1996 in Pine, Arizona.
6. On May 21, 1996, Staff filed a Request to allow ten new connections.
7. Pursuant to our May 21, 1996 Procedural Order, E&R was granted authority to add up to a total of ten new connections which met the five conditions set forth therein.
8. On May 23, 1995, E&R filed a Motion to Continue the hearing.
9. Pursuant to our May 24, 1996 Procedural Order, E&R's Motion was denied.
10. The E&R service territory has historically experienced water shortages especially during the summer months.
11. Pursuant to Decision No. 56539, the Commission authorized E&R to curtail water usage and placed a moratorium on service connections until October 1, 1989.
12. Pursuant to Decision No. 56654, the Commission ordered that E&R continue the moratorium on new connections and main extensions in its Pine system.

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13. The Commission in Decision No. 57047 granted the Company's request to partially lift the moratorium on new service connections by allowing ten new connections per month.
14. The moratorium on main extensions established in Decision No. 56654 has never been lifted.
15. In the OSC, the Commission alleged the following:
 - A. Count I: E&R violated Decision No. 56654, dated October 6, 1989, by constructing three main extensions;
 - B. Count II: E&R violated A.R.S. § 40-361(B) by failing to provide service that is in all respects adequate, efficient, and reasonable; and that will promote the comfort and convenience of its customers; and
 - C. Count III: E&R violated A.A.C. R14-2-405(B)(4) by planning to master meter a subdivision of single family homes.
16. Subsequent to Decision No. 56654, E&R has constructed a main extension near Randall Road and Elm Street, another main near Whispering Pines Road and Fawn Drive, and a third in the Solitude Trails Subdivision.
17. The Randall Road main extension allowed for the looping of the system in a manner to alleviate pressure problems.
18. The Developer's wells for the Solitude Trails Subdivision currently provide excess water for use in the Pine system.
19. According to E&R, its agreements with the Developer will always result in a minimum of 20 percent of the production of the Developer's wells being used to provide water for the Pine system.
20. Because of its recurring water shortages, E&R has adopted a sign system to publicly communicate its current water capacity: green means that the system's storage tanks are full, yellow means that the storage tanks are seventy-five percent full, and red means that the storage level is at fifty percent of capacity.
21. During Staff inspections in April and May, 1996, the red signs were up.
22. Most of the lots in the Solitude Trails development have individual water boxes installed in front of them.

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1 Pipes main extension from its system.

2 IT IS FURTHER ORDERED that E&R Water Company, Inc. shall file with the Director of
3 Utilities Division a copy of its interconnection agreement(s) with the Developer of Solitude Trails
4 Subdivision within 10 days of the date of this Order.

5 IT IS FURTHER ORDERED that the Director of the Utilities Division shall make a
6 recommendation to the Commissioners regarding the approval/disapproval of the interconnection
7 agreement(s).

8 IT IS FURTHER ORDERED that if E&R Water Company, Inc. fails to file the aforementioned
9 interconnection agreement(s) in a timely manner, it shall disconnect the intertie with Solitude Trails
10 Subdivision within 30 days of the date of this Order.

11 IT IS FURTHER ORDERED that if E&R Water Company, Inc. files the interconnection
12 agreement(s) on a timely basis, the intertie with the Solitude Trails Subdivision shall be maintained until
13 further order of the Commission.

14 IT IS FURTHER ORDERED that within 30 days of the date of this Order, the Engineering Staff
15 of the Commission shall inspect all of E&R Water Company, Inc.'s storage facilities and make
16 recommendations to the Commission as the adequacy of those storage facilities both as to the condition
17 of the facilities as well as the amount of storage.

18 IT IS FURTHER ORDERED that effective immediately, E&R Water Company, Inc. shall send
19 a monthly report to the Director of the Utilities Division which sets forth the following information:
20 current amount of storage; monthly production of wells; monthly gallons sold; monthly gallons hauled;
21 and monthly non-accounted water.

22 IT IS FURTHER ORDERED that E&R Water Company, Inc. shall be limited solely to one single
23 family residential connection per month on a first come first serve basis under the same conditions
24 previously set forth in Decision No. 57047 except that those persons referred to in Finding of Fact No.
25 23 shall have a meter installed on their individual residential lots within fifteen days of the Director of
26 the Utilities Division approving their application for service.

27 IT IS FURTHER ORDERED that the moratorium on new main extensions as set forth in Decision
28 No. 56654 is to remain in place until further Order of the Commission.

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1 IT IS FURTHER ORDERED that the Director of the Utilities Division shall base his approval
2 for meter installation for those persons referred to in Finding of Fact No. 23 on such items as:

- 3 a. location of property,
4 b. statement from applicant that he/she will be the water customer of record,
5 c. obtaining a Gila County building permit,
6 d. payment of meter deposit,
7 e. Gila County approval of wastewater disposal system,
8 f. purchase of building materials, and
9 g. any other criteria deemed appropriate by the Director for the individual circumstance.

10 IT IS FURTHER ORDERED that the application for service for the one per month meter
11 installation shall be accepted by E & R Water Company from only the actual property owner that shall
12 be the customer of record, i.e. not from a realtor, contractor, developer or agent.

13 IT IS FURTHER ORDERED that E & R Water Company shall submit monthly reports to the
14 Director of the Utilities Division listing all customers that are on the waiting list for the one per month
15 meter indicating the names of the applicants, property location and date of application along with
16 documentation that these customers have complied with the conditions for service set forth in the
17 Company's approved tariffs, Decision No. 57047, and this Decision.

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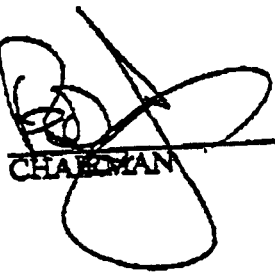
28 ...


DOCKET NO. U-1576-96-269


IT IS FURTHER ORDERED that in the event that the Company fails to comply by the time
the fines imposed by this Order, the Commission's Legal Division is directed to bring an action in Court
to enforce compliance.

IT IS FURTHER ORDERED that this Decision shall become effective immediately.


BY ORDER OF THE ARIZONA CORPORATION COMMISSION.


CHAIRMAN


COMMISSIONER


COMMISSIONER

IN WITNESS WHEREOF, I, JAMES MATTHEWS, Executive Secretary of the
Arizona Corporation Commission, have hereunto set my hand and caused the
official seal of the Commission to be affixed at the Capitol, in the City of
Phoenix, this 18 day of July, 1996.


JAMES MATTHEWS
EXECUTIVE SECRETARY

DISSENT
JLR:dap

UTILITIES DIV.

E & R WATER COMPANY, INC.
U-1576-96-269

NY, INC.

. 24th Floor

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BEFORE THE ARIZONA CORPORATION COMMISSION

1

PINE WATER COMPANY, an
Arizona corporation,

Complainant,

vs.

DOCKET NO.
W-03512A-01-0464

STRAWBERRY HOLLOW DEVELOPMENT,
INC., an Arizona corporation,
STRAWBERRY HOLLOW PROPERTIES,
L.L.C., an Arizona limited
liability company, STRAWBERRY
HOLLOW PROPERTY OWNER'S
ASSOCIATION, INC., an Arizona
not-for-profit corporation,

PREHEARING
CONFERENCE

Respondent.

At: Phoenix, Arizona

Date: June 14, 2001

Filed: JUL -2 2001

REPORTER'S TRANSCRIPT OF PROCEEDINGS

ARIZONA REPORTING SERVICE, INC.

Court Reporting
Suite Three

2627 North Third Street
Phoenix, Arizona 85004-1103

Prepared for: BY: DAWN J. BOSWELL, RPR
CCR No. 50326

ACC

CERTIFIED COPY
(When in red)

ARIZONA REPORTING SERVICE, INC. (602) 274-9944
Realtime Specialists Phoenix, AZ

249 000 0014

BEFORE THE ARIZONA CORPORATION COMMISSION

1

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Complainant,

vs.

DOCKET NO.
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STRAWBERRY HOLLOW DEVELOPMENT,
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ORIGINAL

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Realtime Specialists Phoenix, AZ

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